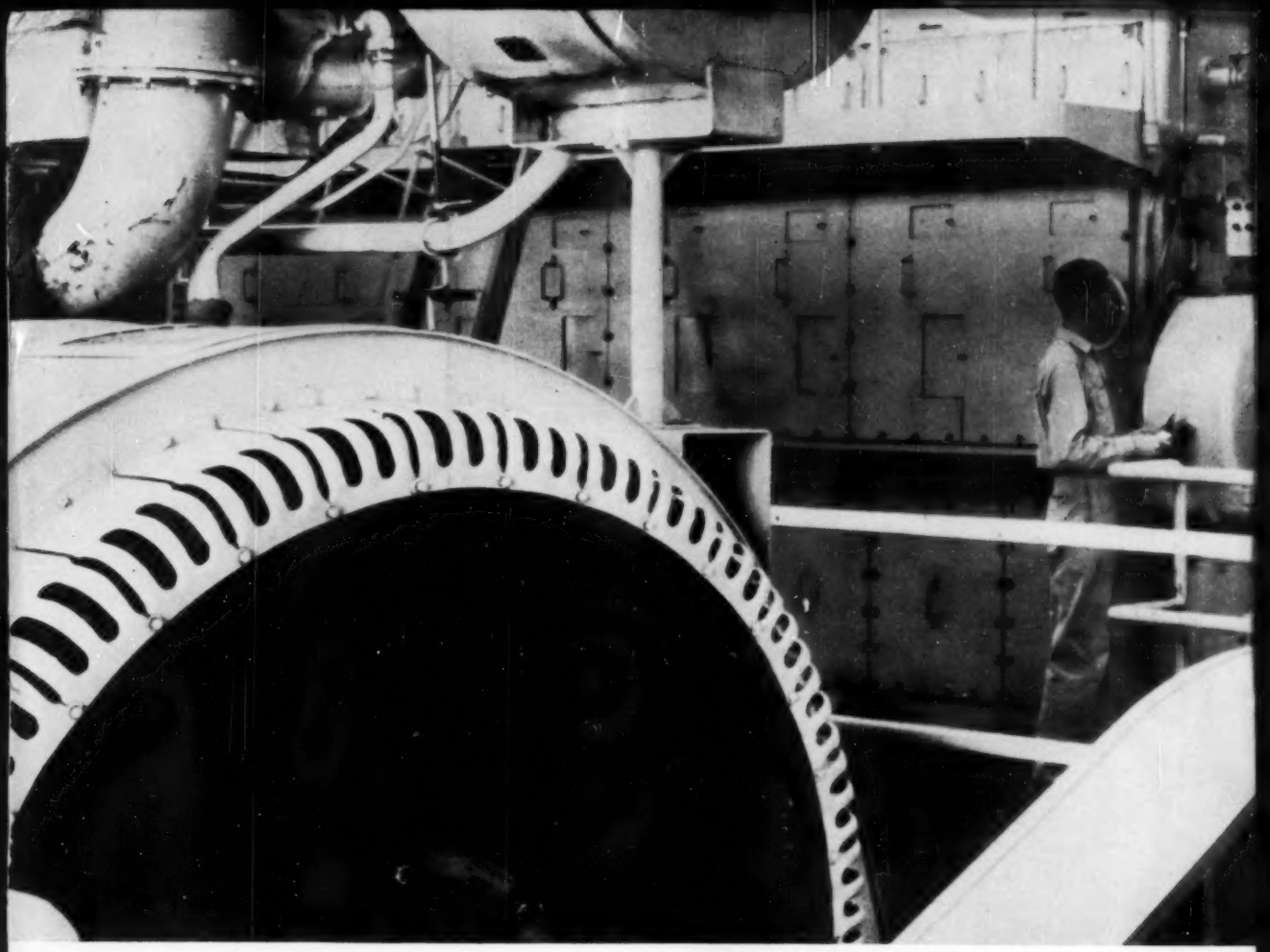
diesel power

July 1958

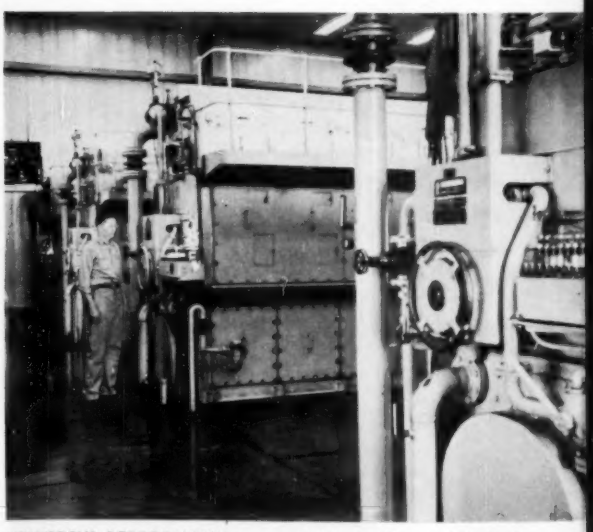
BUYER'S GUIDE ISSUE



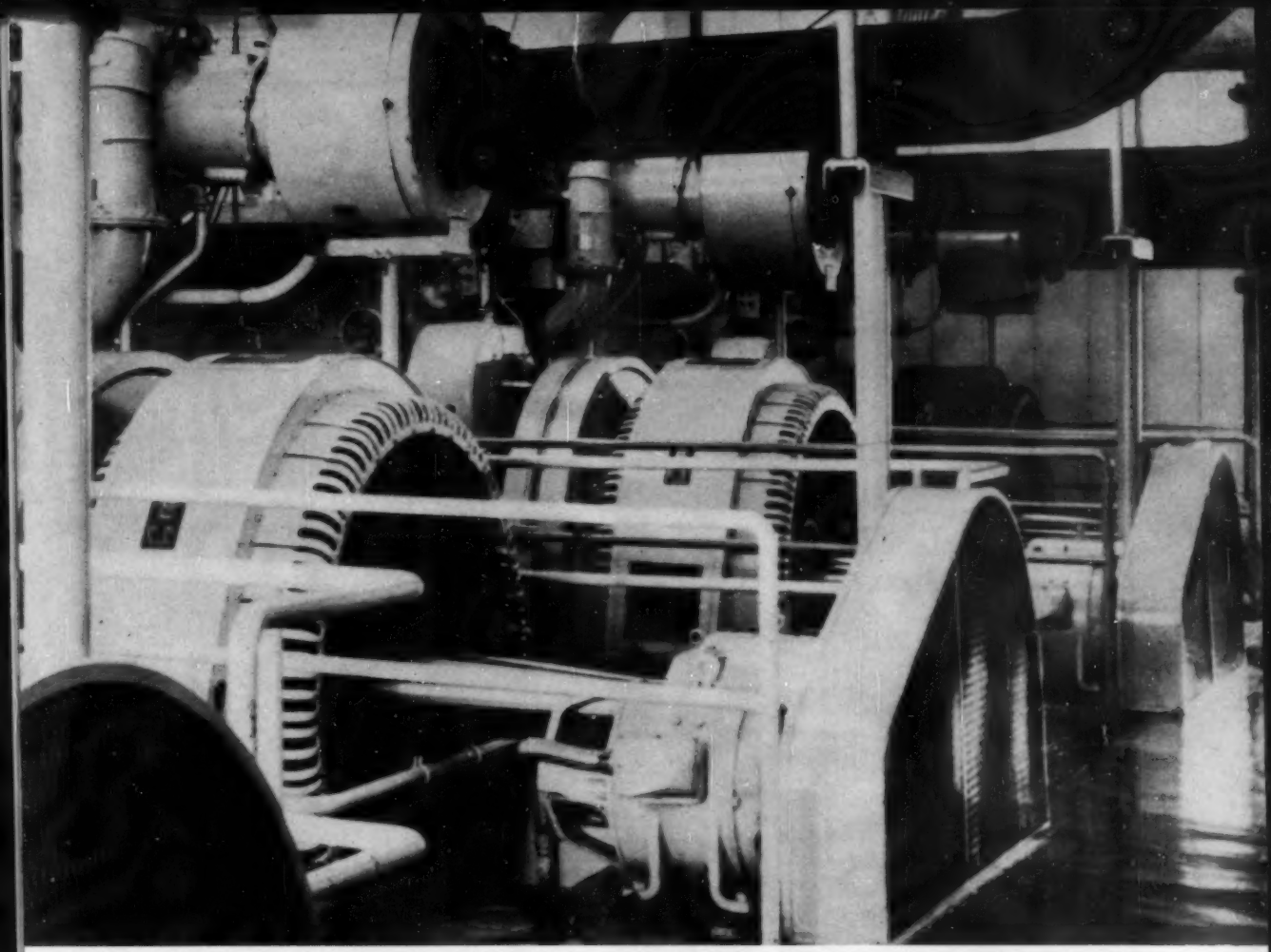
EFFICIENCY AWARD for 1957 (Division A) goes to Federated Rural Electric Assn. for producing power at the low cost of only

"MOST EFFICIENT" REA

A GOOD NEIGHBOR as well as an efficient one, Federated's modern plant is handsomely landscaped, and the engines exhaust into Maxim silencers.



POWERFUL PERFORMERS stay powerful with Texaco Lubrication. Each 8-cylinder 4-cycle Nordberg Duafuel engine is rated at 1750 hp at 327 rpm.



6.54 mills per kwh. Manager Paul L. Ferguson reports that "Lubrication with Texaco Ursa Oil Heavy Duty, and frequent thorough engine checks, have kept average liner wear (all engines, all cylinders) down to 0.005" after 33,000 hours operation."

plant wins title with Texaco

A combination of rigid maintenance standards and the use of Texaco Ursa Oil Heavy Duty has won two *Diesel Progress* awards for efficiency for Federated Rural Electric Association, Jackson, Minn. In 1954, and again for 1957, Federated was named "the most efficiently operated of all REA internal combustion plants." This is how Texaco has helped Federated stay on top:

Texaco Ursa Oil Heavy Duty keeps engines clean, for maximum efficiency. It prevents formation of sludge, keeps the rings free and compression high, so the engine uses less fuel, and runs longer between scheduled overhauls.

Minimizes wear, too. Texaco Ursa Oil Heavy Duty is a premium quality lubricant, one of the complete line of Texaco Ursa Oils especially refined and processed to lubricate diesel, gas and dual-fuel engines. For details on what Texaco Ursa Oils can do in your plant, call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write:

The Texas Company, 135 East 42nd Street, New York 17, N. Y.

LUBRICATION IS A MAJOR FACTOR IN COST CONTROL

(PARTS, INVENTORY, PRODUCTION, DOWNTIME, MAINTENANCE)

A GOOD
SEALING RINGS WITH PREDICTABLE PERFORMANCE
made in a range of diameters from 3/8" to 112"

GRASP

Koppers knows the importance of proper material selection in producing reliable piston ring and seal performance

Predictable sealing performance results when Koppers matches its knowledge of materials performance to your operational requirements. Koppers pioneering in static and centrifugal casting of iron and alloys . . . as well as its recent leadership in the use of plastics in rings . . . results in a background of applications that cannot be equaled.

Koppers piston rings, sealing rings and seals have been selected as standard equipment in hydraulic actuators, butterfly valves, bearings, transmission controls, fuel pumps, hot air valves and fuel injectors. Koppers can solve your sealing problems. Write us stating your problem today. KOPPERS COMPANY, INC., 1307 Hamburg Street, Baltimore 3, Maryland.

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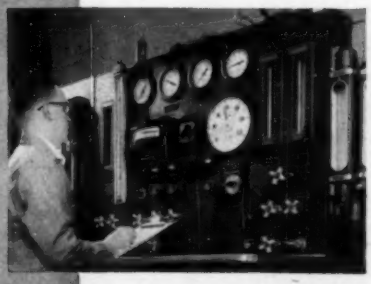
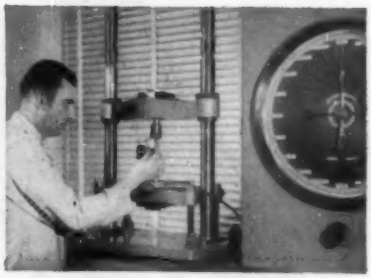
PISTON AND SEALING RINGS

Engineered Products Sold with *Service*



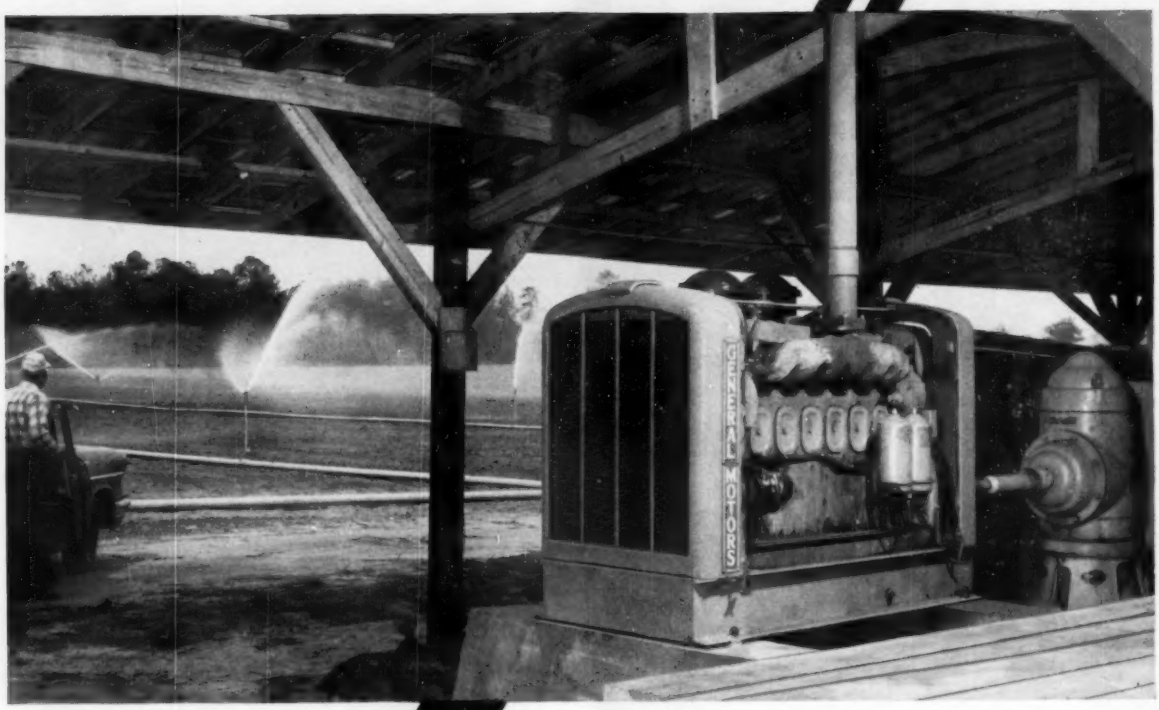
Fluid Dynamics Knowledge gained by Koppers through many years of experience helps solve the most complicated problems involving the control of gases under pressure.

Face Design Knowledge gives Koppers the ability to produce rings and seals that give reliable and economical performance under the most demanding operating conditions.



Materials Knowledge enables Koppers to select the proper material or combination of metals, plastics or ceramics to insure maximum efficiency and length of service.

Drought bites the dust!



Temperatures made to order for all types of diesel engines. Harrison heat exchangers are rugged, reliable and compact . . . engineered to provide the optimum in cooling efficiency.

Harrison-Cooled GM Diesel Saves Crops From Two-Month Dry Spell!

Harrison helps rout the drought! This GM Diesel worked continuously for 60 days and nights operating an irrigation system to save crops during an extreme dry spell. And Harrison coolers kept engine oil temperatures under control. You can depend on Harrison heat exchangers for all kinds of rugged action and long endurance. That's because they're backed by the research and experience of Harrison's 47 years in making top-quality heat-control products. If you have a cooling problem, look to Harrison for the answer.

TEMPERATURES MADE TO ORDER

HARRISON

FROM THE PROGRESS OF THE PAST... GM ...THE PROMISE OF THE FUTURE

HARRISON RADIATOR DIVISION • GENERAL MOTORS CORPORATION • LOCKPORT, N. Y.

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Editor

Joseph S. Cascio
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Emma Corris
Circulation Mgr.

Wilmajeanne Bryant
Production Mgr.

Walter Miles
Art Director

Midwestern Office
Howard Sharp, General Manager
Chester Mozden
Room 206
605 N. Michigan Ave.
Chicago 1, Illinois
Tel: MIchigan 2-5050

Pacific Coast Representatives
M. D. Pugh and Associates
P. O. Box 32188
Los Angeles 32, Calif.
Tel: CApitol 2-8857

Southwestern Representative
Ralph W. Runnels
The Runnels Company
5210 Morningside Drive
Houston 5, Texas
Tel: JAckson 4-6633

British Representatives
Newspaper Representations Ltd.
231-2 Strand,
London, W. C. 2, England

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Georg J. Linder
Linder Presse-Union GmbH.
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BPA

diesel power

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BENDIX FUEL INJECTION EQUIPMENT AIDS OPERATION AT ONE OF CANADA'S LARGEST URANIUM MINES!

The Gunnar Mines, Limited, uranium ore mining operation in Northwestern Saskatchewan is one of the largest producers of uranium in Canada. And to process the uranium ore at Gunnar, diesel power is supplied by Nordberg Supairthermal Diesel engines equipped with Bendix* Fuel Injection Equipment.

Operating only 450 miles south of the Arctic Circle, the diesel equipment must operate efficiently in temperatures that reach –55°F. Since the area does not lend itself to hydroelectric generation of power, Gunnar chose a diesel-electric type power plant. The Nordberg Diesels, each rated 1200 hp at 450 rpm, are directly connected to the generators.

This strategically valuable uranium deposit utilizes its diesel-electric power plant to the fullest. Diesel engines equipped with Bendix Fuel Injection Equipment aid in furnishing the electric power for the mine, mill, and town facilities.

Only the best of diesel equipment and diesel engine components such as Bendix Fuel Injection Equipment were selected for this vital work. For, only the best will do when the demands are great on diesel engines—for all types of industry. And Bendix Fuel Injection Equipment meets the highest standards for exceptional performance. *REG. U.S. PAT. OFF.

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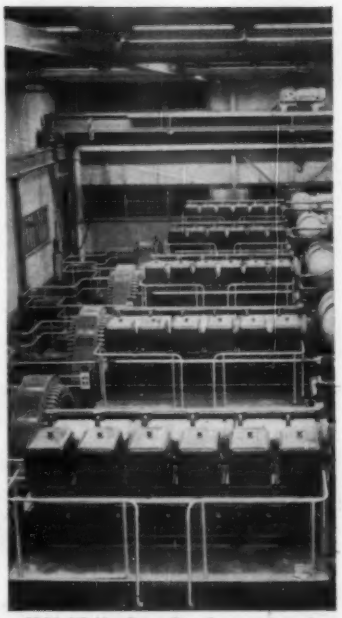

1200 HP Nordberg Diesel generator sets supply 5070 kw.

Scintilla Division
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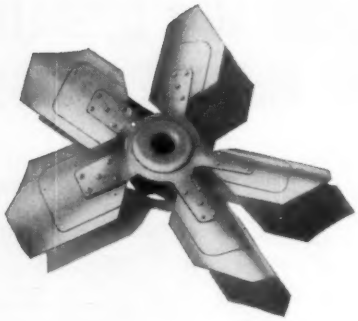
Bendix
AVIATION CORPORATION

See SCHWITZER

FOR A *New Approach*

in Cooling Fans



Creative Engineering and a New Approach have been promoted by Mr. Louis Schwitzer, Sr. for forty years, from his first product, the Cooling Fan, to the present day solutions of complex cooling problems.

Schwitzer has the experience and facilities to design and to apply the right fan for your application.

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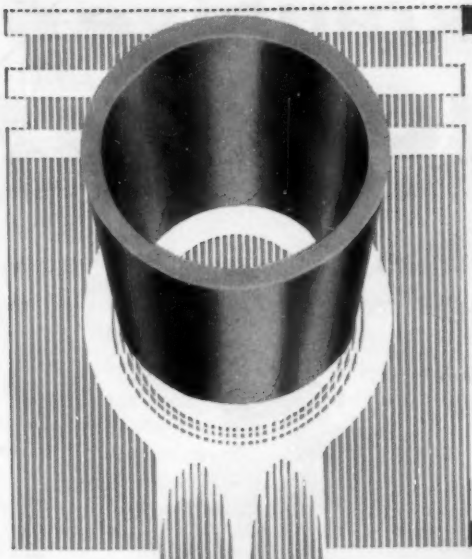
VIBRATION DAMPERS	TURBOCHARGERS
AIR STARTING MOTORS	SUPERCHARGERS

Versatile Advanced Designs for an Economical Solution to Your Cooling Problems



To assure dependable diesel service, use dependable Johnson Bearings

The every-day work of the diesel engine demands the utmost in dependability. It has the responsibility of supplying electric power and light, of driving vital compressors, of maintaining railroad schedules, of propelling ships and trucks—all services upon which the economy of the nation depends.

Diesel manufacturers have accepted this responsibility and have designed their engines to give dependable service. One of the important components in these engines is the bearings—such as those made by Johnson Bronze Company. Engineers and production men alike at Johnson have a keen appreciation of the importance of their assignment. They realize that the engine bearings in the powerful diesels of today are subjected to forces of great magnitude, often at high speeds.

That is why the bearing specialists in the Product Engineering Department at Johnson Bronze work closely with diesel engine manufacturers in designing the proper bearing for each application. They recommend the most suitable bearing material—make sure it is adequate in size, strength and has correct clearance. The lubricating system is taken into consideration and provision made to resist effect of corrosive lubricants.

Johnson produces precision diesel engine bearings for the best in the industry. They may be cast bronze—bronze and babbitt—cast aluminum alloy—aluminum alloy on steel—steel and babbitt. Regardless of size or composition they have the necessary qualities to resist shock loads at high speeds—help the diesel maintain its reputation for dependable service.

To learn more about the services of the Johnson Product Engineering Department, write for a special bulletin. It may point the way to increasing the efficiency and dependability of your engines. Johnson Bronze Company, 470 S. Mill Street, New Castle, Pa.

JOHNSON Bearings

Look at the exclusive HERCULES *Air-Cooled*

THE POWER-PACKED C2-90D

Two cylinders · 88 cu. in. displ. · 35 HP/3000 rpm

★ **Highest HP/Pound:** This rugged power plant packs more horsepower per pound dry weight than any other engine in its class: outperforms all other industrial air-cooled engines.

★ **Lower Fuel Consumption:** Higher volumetric efficiency means less fuel for the same power: up to 30% savings over competitive engines.

★ **Excellent Response:** Specially developed, two-barrel carburetor gives the C2-90D unequalled flexibility: keeps it "on top of the load" at all times.

★ **Wide Octane Tolerance:** The C2-90D can be run with gasolines from 75-100 octane rating: no need to "spoon-feed" this tough engine!

★ **Close Speed Regulation:** For constant speed applications, the Hercules C2-90D is unequalled: specially developed governor gives 2½% regulation from no-load to full-load, and regulation of 1% and better has been realized.

★ **Fully Replaceable Bearings:** This feature permits complete "top overhaul": engine need not be dismounted for repairs.

★ **Full-Pressure Lubrication:** Direct-drive, gear-type pump gives positive lubrication to wear points for longer life.

★ **Rugged Construction:** Extra-heavy crankshaft is fully balanced; stellite-faced valves and seats are available for longer wear; main bearings are oversize—no field failures over the past three years.

★ **Easy Starting:** Hot or cold, with manual or automatic starting, the Hercules C2-90D kicks over quickly—in all weather, indoors or out.

AND THE COMPANION CV4-180 . . . IN A CLASS BY ITSELF!

Four cylinders · 176 cu. in. displ. · 71 HP/3000 rpm

★ **71 Horsepower:** No other industrial air-cooled engine comes close to the power range this V4 offers!

★ **Responsive Power:** Carburetion system, governor, and "oversquare" bore/stroke ratio combine to give the Hercules CV4-180 excellent response and close regulation, no-load to full-load.

★ **and Economical, Too:** The Hercules CV4-180 has excellent fuel economy; has all the maintenance-saving features of the C2-90D too, for long-term operating economy.

AND MOST WEARING PARTS ARE INTERCHANGEABLE BETWEEN BOTH ENGINES!

benefits you get with
ENGINE POWER

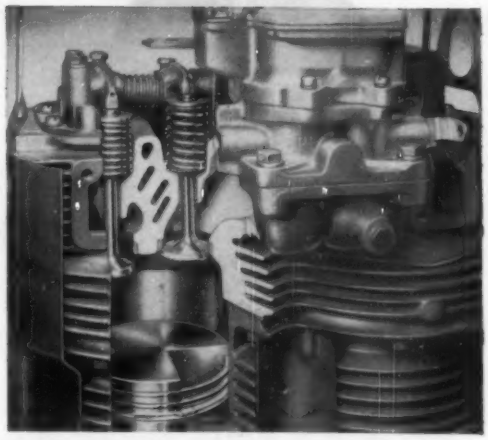
★ EFFICIENT COMBUSTION CHAMBER DESIGN

evolved by Lycoming, designers of these air-cooled engines, is clue to their outstanding performance.

Sealed down-draft carburetor especially developed for these engines enables them to pick up load *fast* over entire speed range.

Overhead valves permit high compression at high efficiency. The exhaust valve runs cool too, without the need for an "over-rich" mixture. **Short intake manifold** delivers mixture at high turbulence, giving these engines wide octane tolerance and **LPG fuel** can be used without excessive loss of power rating. **Stellite-faced valves and seats** give long service and **double tapered piston rings,** with chrome-plated top ring, retain their seal at all speeds. **Honed cylinders** hold oil film even over long shutdown. **"Oversquare" design,** where bore dimension exceeds stroke, gives slower piston speeds and longer life—helps make engine responsive.

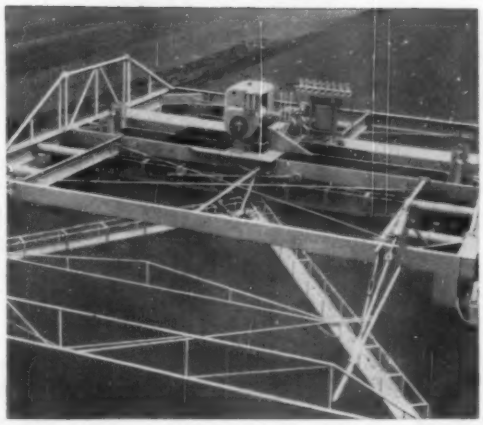
Exhaust manifold provides low back pressure, another factor in efficient operation.



★ AND JOB-RATED TESTING means you get the power you specified!

Every Hercules air-cooled engine is given a complete test run before it is shipped. This check of the actual horsepower delivered by your engine is your guarantee of proved performance and workmanship.

And Hercules air-cooled engines will stand up under constant, grueling service conditions, too. After a 1000 hour test run, all parts of a Hercules C2-90D were within original design tolerances—dramatic proof that these outstanding engines are built for endurance.



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. . . sold and serviced the world over

For further information, write or call your nearby Hercules representative. Or use the coupon to get copies of specification data.

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Please send more information on the Hercules
☐ C2-90D and/or ☐ CV4-180 engines.

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15% more torque from the same air pressure while consuming 30% less air! *It's the new*

SIOUX

Air impact wrench!

"Free as the air" is an expression which has little application to compressed air. Learn more about the truly remarkable efficiency of the new SIOUX Air Impact Wrench.

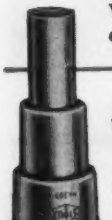
Unexcelled Performance and Durability....

It's the

SIOUX

Electric impact wrench

When it comes to electric impact wrenches, here is the maximum in dependable power per dollar. Available in ½" or ⅝" drive.



PELICAN

Spin nuts on or off without touching them . . . it's the *new* SIOUX

"Pelican" NUT ACCUMULATOR

Action of the impact wrench removes nuts and spins them up into the Pelican on a center stem. The stem will hold ten ¾" or 13/16" hex nuts, either 7/16" or ½" thread. Reverse action spins the nuts back on. Stems can be removed with their load of nuts and empty stems installed in their place. Or, stems can be pre-loaded and placed in Pelican for assembly operations.

The Pelican may be used with any ½" or ⅝" square drive, air or electric impact wrench.

PELICAN IN USE WITH NEW SIOUX AIR IMPACT WRENCH

LOADED CENTER STEM

LOOK UNDER "TOOLS—ELECTRIC"

WRITE FOR THE NEW CATALOG

SIOUX

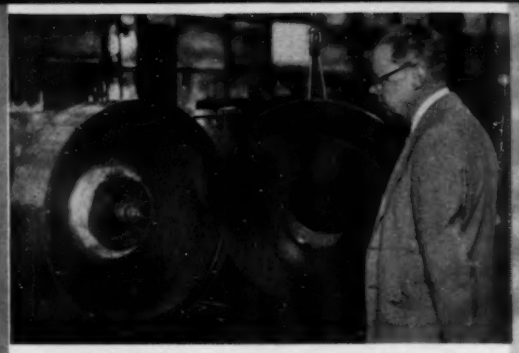
ALBERTSON & CO., INC.

SIOUX CITY, IOWA, U.S.A.

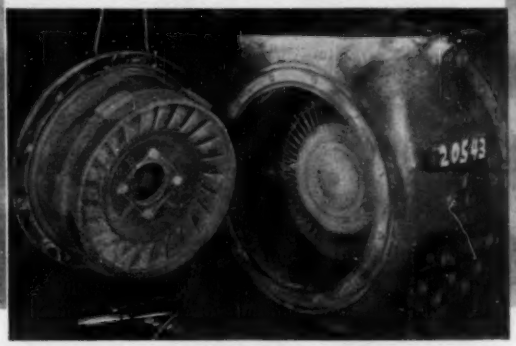
NEW AIR IMPACT WRENCHES • NEW AIR SCREWDRIVERS • NEW "PELICAN" NUT ACCUMULATORS • ELECTRIC IMPACT WRENCHES • DRILLS • GRINDERS • SANDERS • POLISHERS • SCREWDRIVERS • PORTABLE SAWS • VALVE FACE GRINDING MACHINES • FLEXIBLE SHAFTS • ABRASIVE DISCS

after 35,000 hours of service... this ELLIOTT turbocharger is still in good running condition

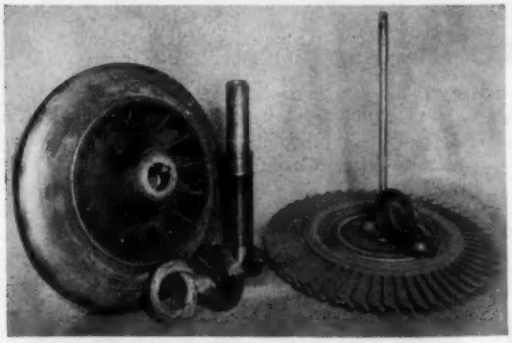
(It operated continuously—24 hours a day—for four years)



Inspection (of the blower end) by turbocharger engineer reveals remarkable condition even after four years service.



A view of the turbine end of the Elliott turbocharger shows only slight erosion on the turbine blades and nozzle ring.



After complete disassembly, inspection of the rotors revealed little or no evidence of wear on the journals, thrust faces, and bearings.

dependable operation with ELLIOTT turbochargers!

for two-cycle and four-cycle diesel engines 175 hp and up

Here's what happens to Elliott-engineered turbochargers under continuous 'round-the-clock operation. Serving gas-engine compressors in a midwestern pipeline compressor station, this turbocharger was originally installed four years ago. When shut down and returned to the Elliott plant for inspection, it was found to be in good running condition after *35,000 hours of service.* This outstanding record of dependable service is further proof of Elliott's superior design and workmanship. That's why it pays to specify Elliott for all turbocharger requirements.

ELLIOTT Company

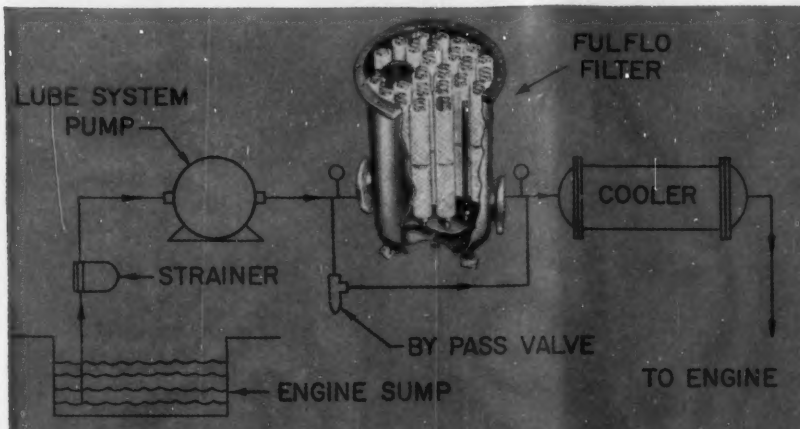
Turbocharger Department

JEANNETTE, PENNSYLVANIA

M7-2

Get longer engine life —

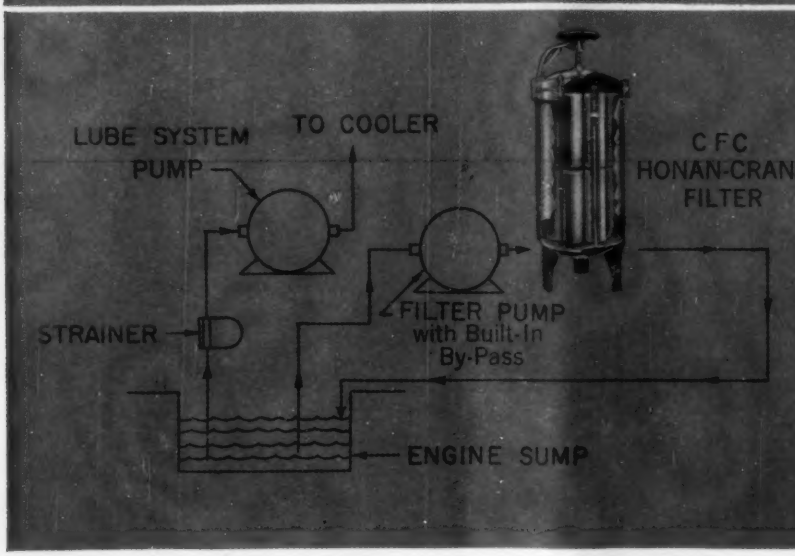
with Fulflo and CFC Honan-Crane Lube Filtration Systems



FULL FLOW SYSTEM

For True Depth Filtration. Fulflo Filters with genuine Honeycomb Filter Tubes (illustrated) provide micro-clarity of lubricating oils . . . for stationary engines, mobile equipment and for bulk filtration.

For Surface Full Flow Filtration: CFC Flo-Pac is offered in a variety of models using 1 to 36 resin-impregnated pleated paper cartridges.



BY-PASS SYSTEM

The CFC Honan-Crane Multi-Cartridge Filter (illustrated) offers seven types of interchangeable cartridges — inert media for solid contaminants, or Cranite (fuller's earth) for removal of solid particles and all products of oxidation.

CFC Michiana Filters, furnished as original equipment for many leading diesel engine builders, are available in a variety of models to provide rugged, efficient service, within a minimum space requirement.

Fulflo Filters for diesel *fuel* may be applied to either pressure or suction side of fuel line.

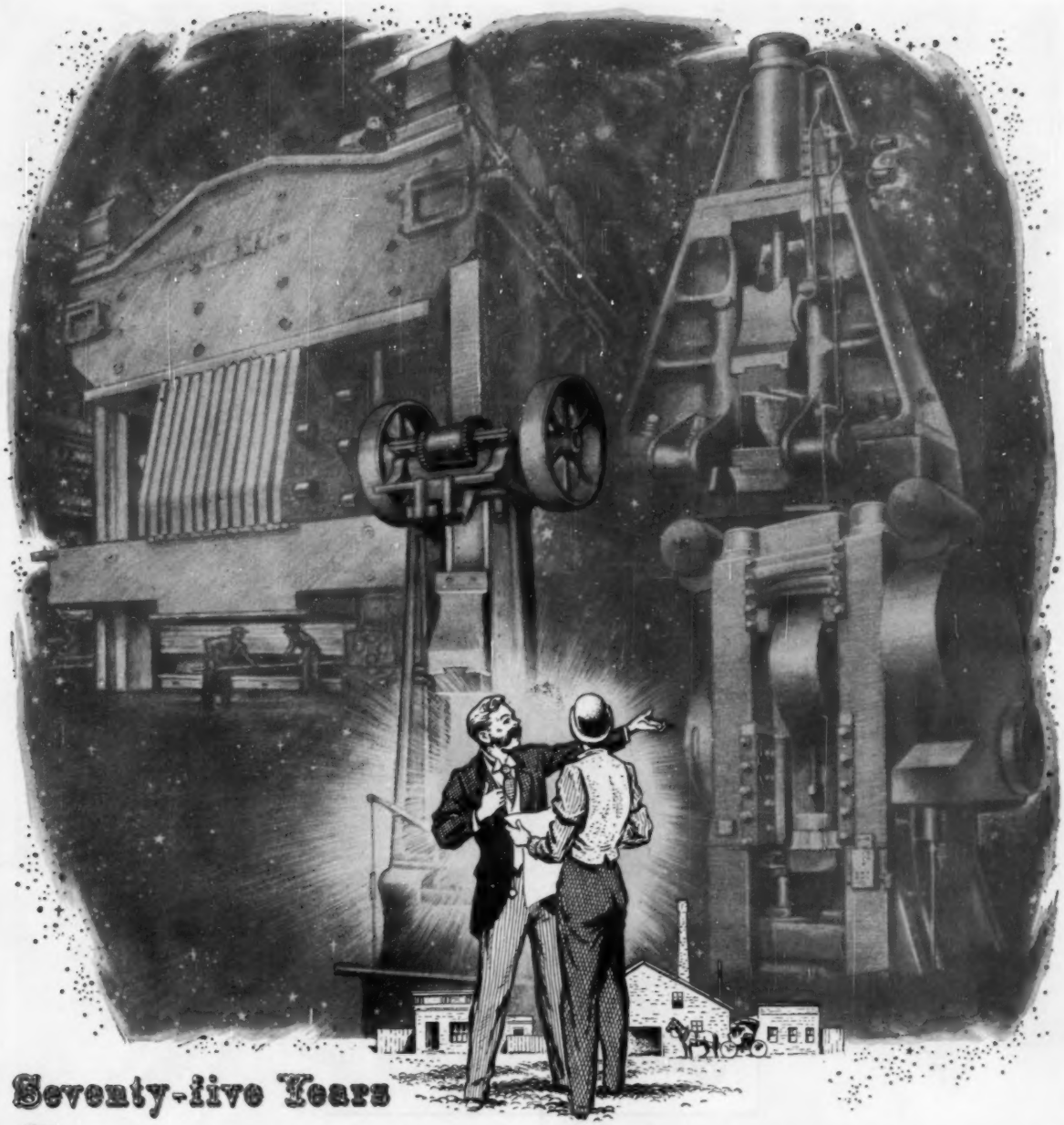
For new catalog, write today to Department DR

COMMERCIAL FILTERS CORPORATION
MELROSE 76, MASSACHUSETTS
PLANTS IN MELROSE, MASSACHUSETTS AND LEBANON, INDIANA

MICRO-CLARITY AT MINIMUM COST

Fulflo Filters — *with genuine Honeycomb Filter Tubes for controlled micro-clarity of industrial fluids.*

CFC Filters — *Selective filtration of oils • water-oil separators • magnetic separators • pre-coat filters • coolant clarifiers • automatic tubular conveyors.*



Seventy-five Years

THERE WAS a growing surplus in the United States Treasury—the Polygamy Act was passed—letter postage was reduced from three cents to two cents—the Brooklyn Bridge was opened—standard time was adopted—in 1883, when two young men, just graduated from Worcester Polytechnic Institute, established the business bearing their names—WYMAN-GORDON. The total capital was $27,000.

Integrity, initiative, ambition and ability were theirs. Endowed with these qualities and privileged to operate under that unique American system of free, private, competitive enterprise the Company prospered and grew.

On this our 75th anniversary, we salute the spirit of our founders and we pledge our every effort to help preserve, against the steady erosion of the last quarter century, that system which has made our nation what it is today and which has enabled us to build the greatest industrial production in the world, resulting in the highest standards for all segments of our people.

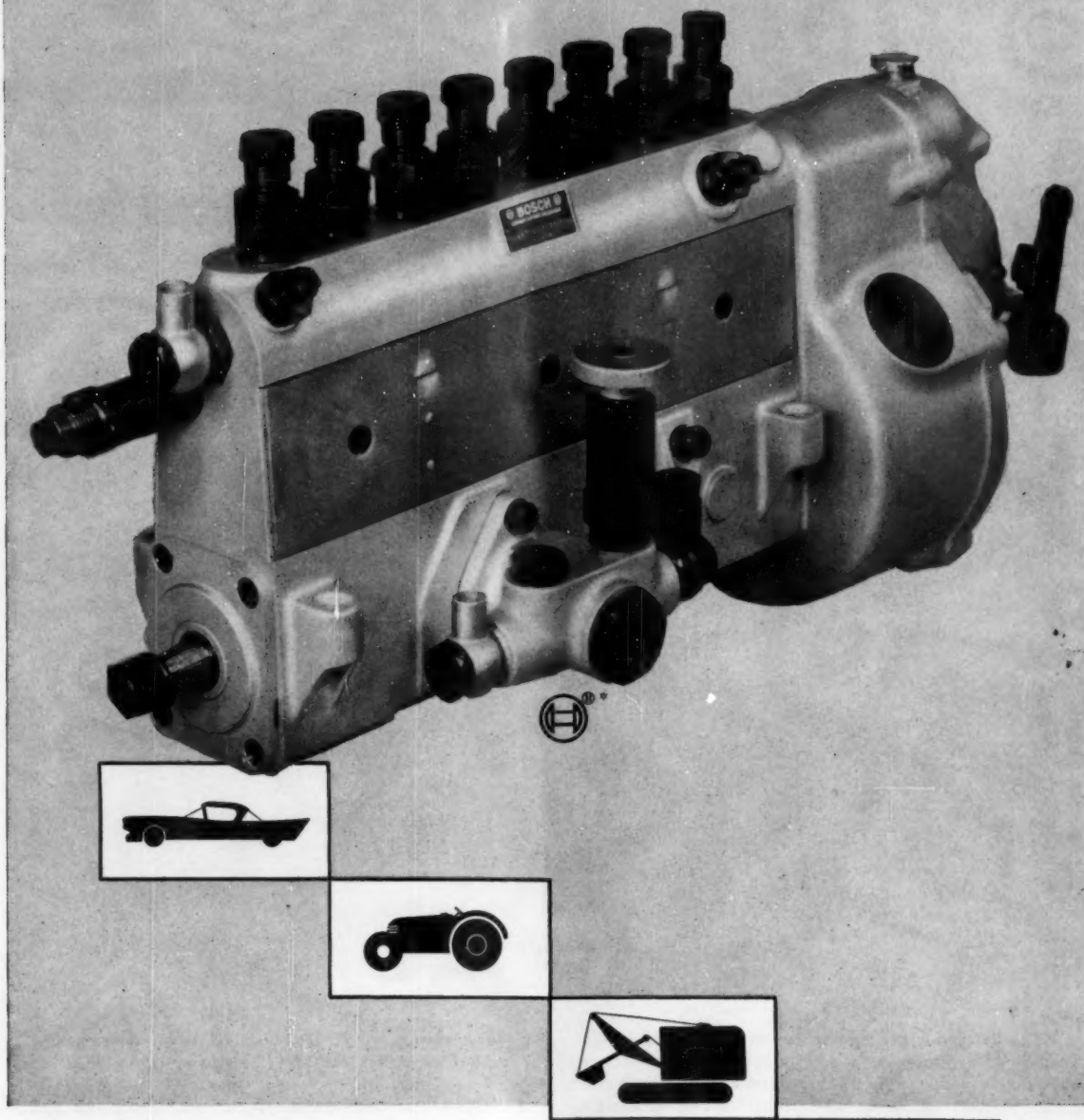
WYMAN-GORDON COMPANY

ESTABLISHED 1883

FORGINGS OF ALUMINUM • MAGNESIUM • STEEL • TITANIUM

HARVEY, ILLINOIS — WORCESTER 1, MASSACHUSETTS — DETROIT, MICHIGAN

THE PROOF RUNS INTO THE MILLIONS



Proof of injection pump performance cannot be established by the record of one or a hundred or a thousand engines. Every manufacturer knows this.

Robert Bosch Fuel Injection Equipment has been proven on millions of engines! This record of dependability stands alone in the industry.

The experience it represents is at your service now.

First in Gasoline Injection too!

Spectacular records in power, speed and economy have been achieved with Robert Bosch Gasoline Injection Equipment.

ROBERT BOSCH CORPORATION

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*Registered U. S. Pat. Office, Robert Bosch G.M.B.H., Manufacturers of Robert Bosch Products

CP GAS ENGINES SET PERFORMANCE RECORDS

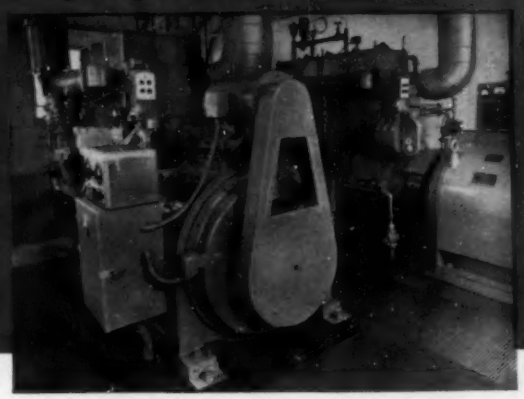
at The Peoples Natural Gas Company

...NO REPLACEMENT PARTS IN OVER 20,000 HOURS!...

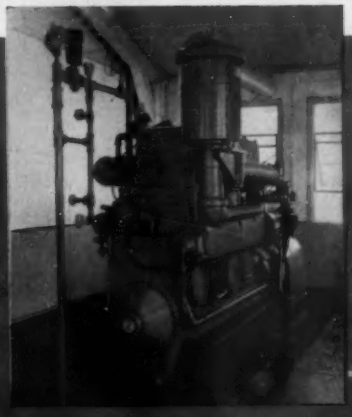
...NO PLUGS OR MAGNETO POINTS REPLACED IN OVER A YEAR!

...LUBE OIL CONSUMPTION 18,000 HP/hrs. PER GALLON!...

FUEL CONSUMPTION – LOW AS 7.2 cu. ft. per HP/hr. @ FULL LOAD



Entire plant operation depends on the CP-39, left, and the CP-49 Gas Engine in right background.



Front view of the CP-49 in operation at Peoples Natural Gas Company.

A pair of CP naturally aspirated, spark ignited natural gas engines, developing a total of 260 h.p., are installed at The Peoples Natural Gas Company, McKeesport, Pa. These units generate electricity to run water pumps cooling a bank of compressors, electricity for fan chilling the cooling water, and electricity for plant lighting and instrumentation. Operators report that these engines are easy to start, simple to maintain and respond promptly to load changes. Since their installation in September 1952, these CP Gas Engines have been rated as among the best engines of their type in the gas transmission system of this company.

CP Spark Ignited Gas Engines are available from 100 h.p. to 2000 h.p.

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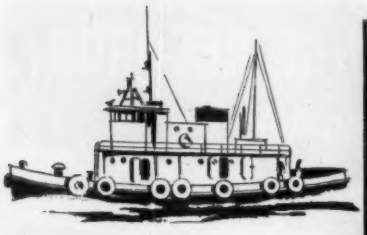
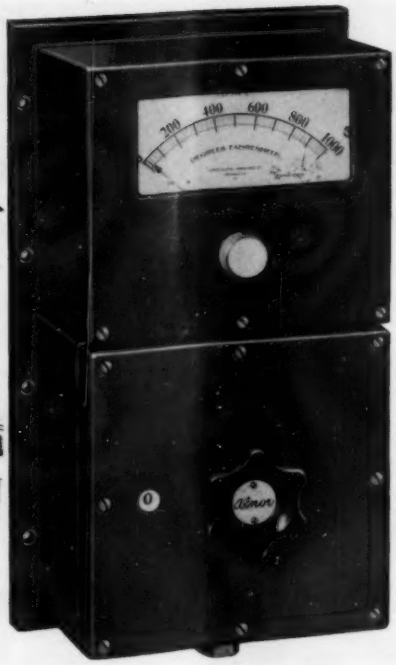
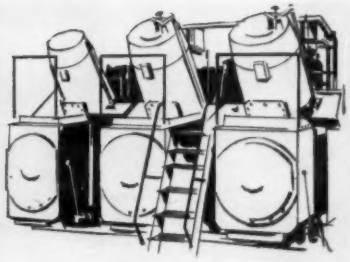
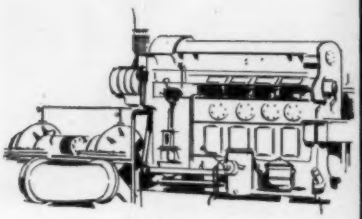


Marine

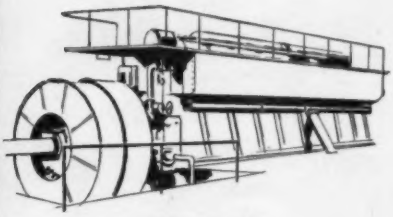




Engine compressor



Pumping



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Accurate check of exhaust temperatures with an Alnor Pyrometer system can assure minimum fuel consumption per horsepower and long service from the power you bought—without the interruption of many common-cause breakdowns.

At a fraction of the cost of your present engine maintenance bill, an Alnor system can give you advanced warning of:

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says Mr. Mel McClure, Shop Supt.
Yellow Transit Freight Lines, Inc.

The Yellow Transit Freight Lines, Inc. uses Purolator AF-50 dry-type Air Filters in all 302 of its fleet of Kenworth line haul tractors.

As a result, they have practically eliminated damage caused by dirt in the engine . . . reduced engine down time to a minimum . . . and saved thousands of dollars in maintenance.

To accomplish these major economies in time and dollars, the air filter is cleaned at each 8,000-mile P.M. inspection. In this way, each air filter is used for 32,000 miles before being discarded. "As a result, dirt is kept out of the Turbo Charger and combustion chamber, which is what we want for longer engine life. We'd rather clean the filters more often, than to have dirt enter the engine," says Mr. McClure.

This is another example of how leading fleets protect equipment, save money, and improve operation profits with Purolator Dry Type Air Filters.

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"Purolator" Reg. U. S. Pat. Off.

Oil, Air & Fuel Filters

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ADVANCED DESIGN PISTONS

By GILLETT AND EATON

for Longer Heavy Duty Service

TROUBLE-FREE with thousands in use

★ Low initial cost... Low cost per mile

★ Amazing increase in piston life

★ Maintains new engine power and performance

WIRE INSERTS PUT CAST IRON WEAR IN TOP RING GROOVE

G and E Wire Insert Piston before machining (left) and after ring grooves are cut (right) showing how the steel wire forms a tough wear-resisting surface on both faces of top ring groove. The patented ferrous plug molded in the head (for diesel pistons) prevents burning through head and lengthens diesel piston life!

With the thousands of G and E "Wire Insert" Pistons in use for periods up to 3 years—a phenomenal record for trouble-free operation has been established. The "Wire Insert" greatly reduces top ring groove wear and increases piston life.

The "Wire Insert" piston design—exclusive with G and E—combines all the advantages of aluminum alloy pistons with the long life of steel in the top ring groove lands. No noticeable increase in weight—unequalled for rapid heat flow—and at low cost.

A pre-shaped steel wire is cast into the piston where the top ring is located. When the grooves are machined, the closely spaced wire surfaces form hard bearing areas on top and bottom faces of the groove. Result—reduced ring land wear, longer piston life at lower cost.

Get the G and E Wire Insert story today.

as LIGHT as aluminum...wears LIKE IRON

VANASIL Pistons have repeatedly run way over 200,000 miles with only .002" to .005" wear on the top ring grooves. On-the-road ring breakdowns caused by badly worn grooves are almost eliminated because *Vanasil Pistons reduce top ring groove wear up to 75%!* Nothing else compares with the genuine G & E Vanasil —the original high Silicon aluminum alloy, proven by 19 years of use.

You Get ALL These Advantages Only In GENUINE VANASIL PISTONS

G & E PROVED Vanadium...High Silicon...Aluminum Alloy

1. LIGHT WEIGHT—Same as other aluminum alloys.
2. SCORING, SCUFFING MINIMIZED—Because of "Oil Absorbing" microscopic porous texture.
3. LONGER LIFE—30% less friction—30% harder. Greater "hot strength"—see chart at right.
4. TOP RING—Breakage virtually eliminated because of reduced ring groove wear.
5. LOW EXPANSION—Characteristics of Cast Iron.
6. CLOSE CLEARANCES—Fitted with Cast Iron Clearances.
7. SOLID SKIRT DESIGN—No expansion devices required.
8. HIGH HEAT CONDUCTIVITY—Similar to other aluminum alloys.
9. PLATING—No tin or other break-in coating required.

VANASIL PISTON WAREHOUSE STOCKS

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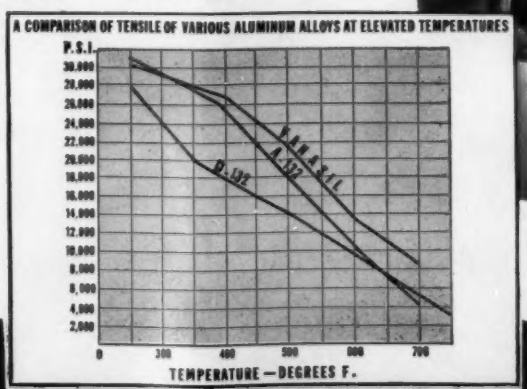
NEW YORK—Bethlehem Equipment Co., 109 W. 64th St., New York 23

VANASIL* "OIL-ABSORBING" PISTONS FOR GASOLINE AND DIESEL ENGINES

*Gillett & Eaton's trademark for a vanadium... high silicon... aluminum alloy.



Write for complete information and prices on Gillett and Eaton's Wire Insert and Vanasil longer lived pistons.

"Our 90th Anniversary Year"

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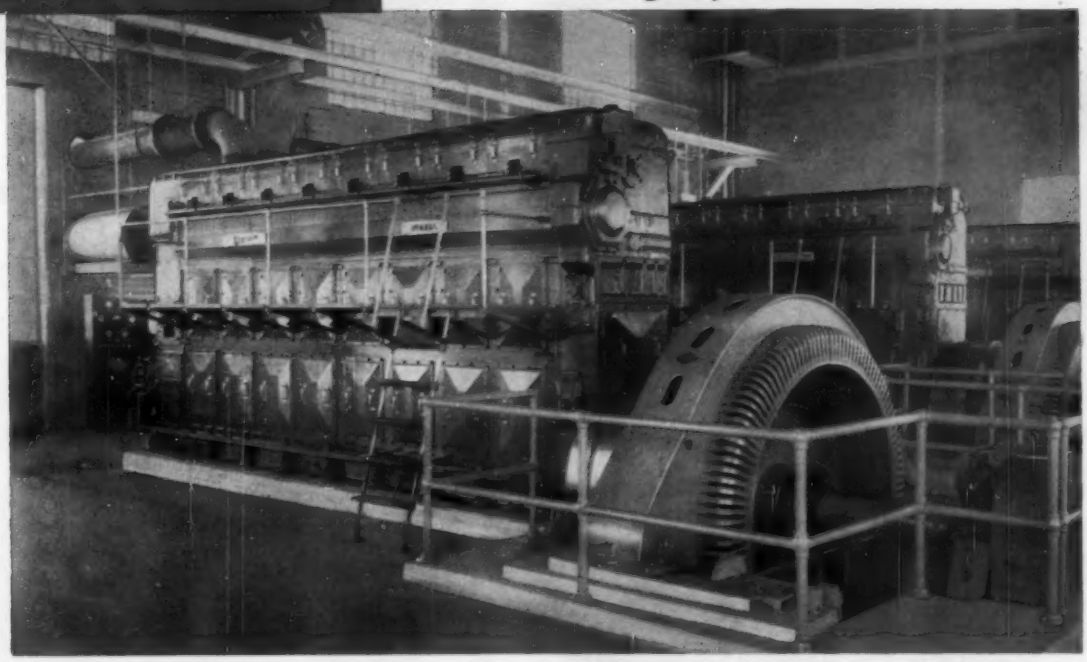
Superior Engines . . .

give you all the proven benefits of simple design

Easy Operation
Efficiency
Economy
Dependability
Long Life



Extreme design simplicity distinguishes White's Superior engines. Relatively few cylinders and internal parts provide power equal to other engines having more cylinders and more complex construction. Such simplicity gives you many benefits. Superiors are *easier to start and operate.* The open chamber design achieves *efficient combustion* under all speeds and loads, giving *economical operation on non-premium fuels.* Fewer moving parts mean *fewer replacements and longer life.* Cylinder block design allows easy accessibility to internal parts for quick inspection and servicing. Hundreds of satisfied customers throughout the world repeatedly specify Superior Diesels for prime power, supplementary or standby power. Superior's simplified design proves its worth daily on municipal, public utility, construction, marine, oil field, and general industrial applications. Diesel, dual-fuel, and gas engines are available in the range from 225 to 2150 H.P.; portable or stationary generator sets from 150 to 1500 KW.

TYPICAL INSTALLATIONS

WOODSFIELD, OHIO: 1250 KW Model 80 dual fuel engine generator set.

ALBUQUERQUE, N. MEXICO: 250 KW Model 6G-825 gas engine generator set.

GRAETTINGER, IOWA: 500 KW Model 60 diesel engine generator set.

MILFORD, IOWA: 645 KW Model 60 dual fuel engine generator set.

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White Diesel

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The White Motor Co. Plant and General Offices: Springfield, Ohio

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Since 1862, when Pickering's fly-ball governor was invented to put a check-rein on speed, the name has meant dependability, quality and leadership in speed control devices. Today, Farris-Pickering continues to be foremost in the field, with 96 years of progress in research and development behind every design. For example, the Type 4300 Governor pictured is typical of the advanced design, engineering, precision manufacturing, superior service and dependable performance that is meeting the exacting requirements of modern industry for precision speed control equipment. This is the kind of equipment that industry has been expecting—and getting—from Farris-Pickering for nearly a century.

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Precision Speed Controls Since 1862

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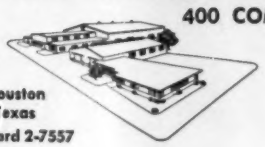

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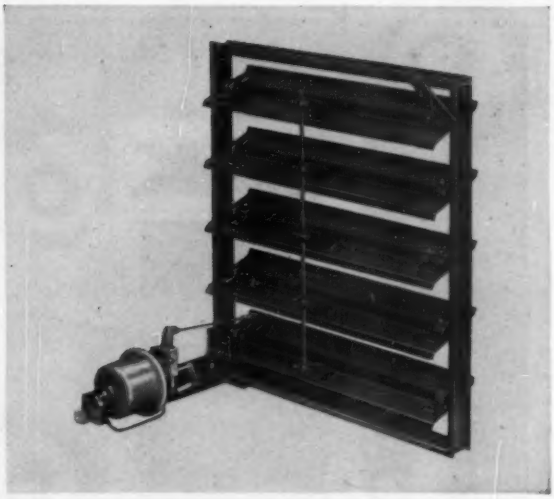
Get the *exact* shutter, damper or louver you need from Honeywell. Specify any style or type, any blade materials and setting, any edging materials, any operator-mounting arrangement. Louver, round or right angle mixing types available for pneumatic, electric or manual operation. Whatever your needs, you're assured smooth, uniform performance when you specify custom-made Honeywell shutters for dependable air flow control.



...AND SHUTTER OPERATORS

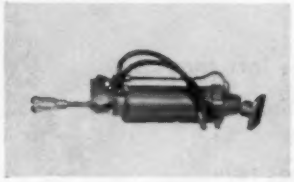
...ruggedly built for precise positioning—electric or pneumatic

There's an electric or pneumatic motor for every shutter application in the all-inclusive Honeywell line. Two or more motors can be operated in sequence or in unison. Motors can operate two or more shutter sections, provided the combined shutter load doesn't exceed motor capacity. Available for two-position or proportioning control.

Call your nearby Honeywell field engineer for a discussion of your needs. He's as near as your phone. MINNEAPOLIS-HONEYWELL, Wayne and Windrim Avenues, Philadelphia 44, Pa.

PNEUMATIC MOTORS

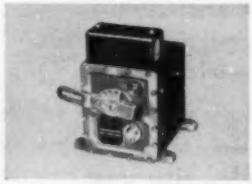
Grad-U-Motor shutter motor. Three sizes, for operating up to 48 sq. ft. of shutter area.



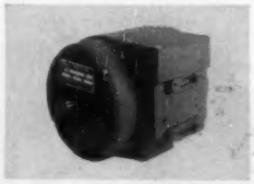
Heavy-duty, pistontype ***Grad-U-Motor.*** For operating up to 96 sq. ft. of shutter area.

Air-O-Motor diaphragm motor. Three sizes, for operating up to 310 sq. ft. of shutter area.

ELECTRIC MOTORS



Modutrol motor operates up to 70 sq. ft. of shutter area.



Actionator operates up to 100 sq. ft. of shutter area.

Series 831E Industrial Motor operates up to 370 sq. ft. of shutter area.

Honeywell

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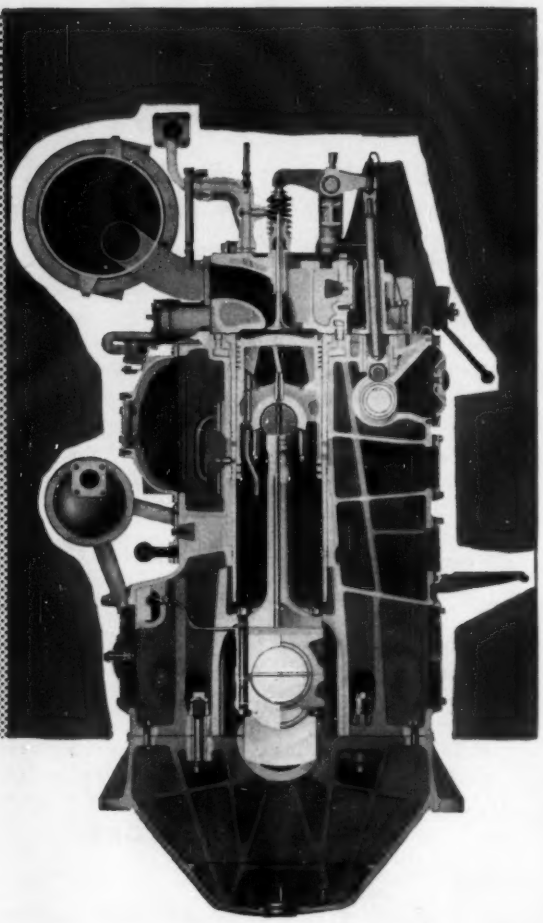
TWO-CYCLE

DIESEL ENGINES

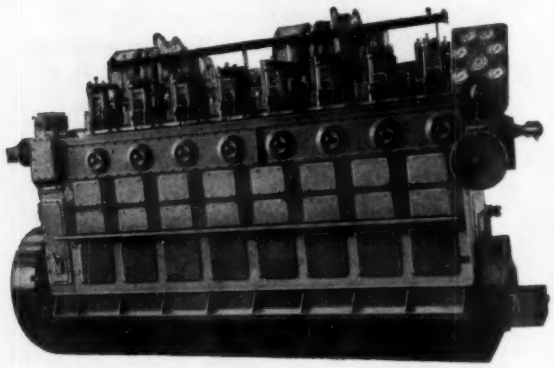
500 to 1,000 H.P.

Z 421



WITH UNIFLOW SCAVENGING have
high stroke volume — i. e.
longer effective stroke, because
there are only air inlet ports.
An unsymmetrical valve-timing diagram
permits an additional air charge.

They perform particularly well under full load because uniform heat loading protects the liners from buckling. There is no coking of the exit ports as there are exhaust valves. Smooth travel of the piston results in low ring wear



The picture to the left shows:
MaK two-cycle Diesel Engine
Type 8 Zu 421 AK
with supercharging, rated
1,400 H.P. at 371 r.p.m.

If desired we are quite prepared to send
you our booklet No. 404.

MaK

MASCHINENBAU KIEL AKTIENGESELLSCHAFT
GERMANY

Editorially speaking -

Light Diesel Vehicles are Coming

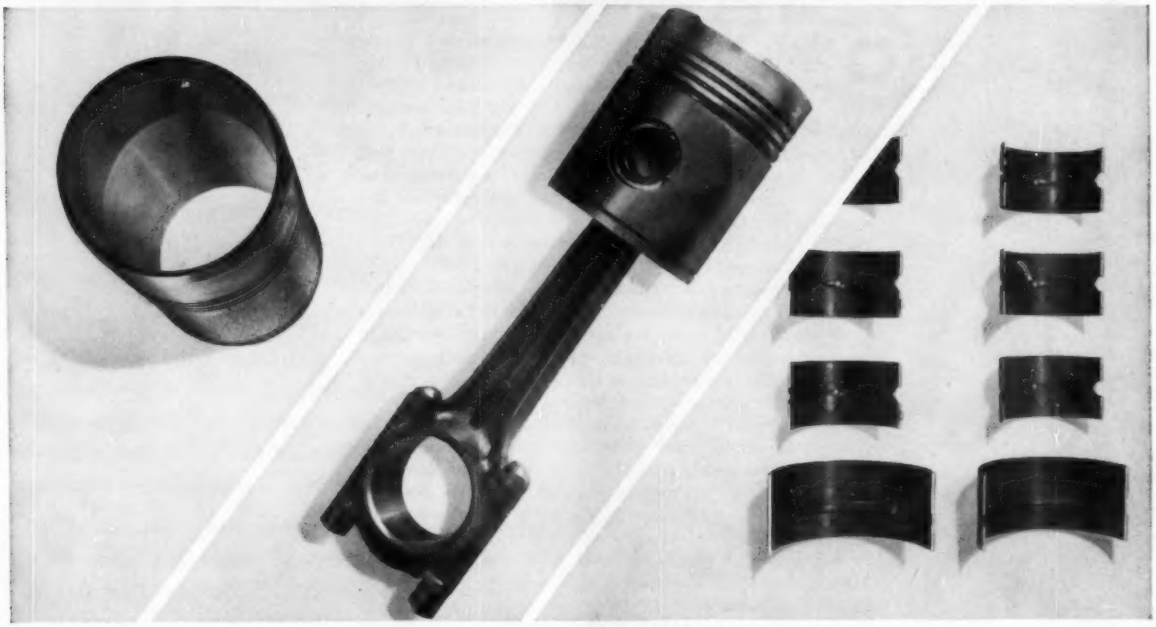
A South Bend cab fleet is testing three diesel-powered cabs. A Baltimore fleet has run converted diesel cabs for two years. In Washington, a diesel cab owner-operator is happy about his slashed operating costs. There are others too but let's use these straws in the wind for comment. First, this is commercial transportation. We've seen what diesels can do in mass transportation of people and freight. If you think transportation costs are high now, figure what they would be without diesel economy. So why not apply it for lighter vehicles? It's done in Europe. Yes, and the first and third cases mentioned are using imported Mercedes-Benz 180-D's. The second is using Plymouths converted with Perkins engines. These owners wanted suitable diesel vehicles to help lick the mounting economic squeeze felt by all forms of transportation. Economics forced foreign diesel usage long ago, even for passenger cars, and did so before the diesel had progressed to its present excellence as a vehicular engine. We foresee a similar trend here for commercial vehicles where ever annual mileage is enough to permit savings to amortize the diesel's higher cost in a reasonable period. In cab fleets and some light truck applications this shouldn't be hard, *if the premium cost is held down.* We have no American-built light diesel vehicles so right now the choice is an import or conversion. There's no shortage of conversion engines. Mentioning two, Hercules and Waukesha have had suitable engines and complete conversion data for a good many years. But conversions have been made pretty much on an individual basis. While entirely feasible, both technically and economically, they would pose problems if a mass-market for light diesel vehicles should be developed. It would be better, and probably cheaper, to have diesel-powered models available right from the factory assembly lines. Diesel builders and Detroit should get together. Engine builders have suitable engines right now; Detroit is showing more interest in diesels (witness Ford and Dodge coming out with diesel truck models); fleet operators are also showing interest; economic pressures are, if anything, increasing. So the time is right. Get the right products, start some imaginative door-bell ringing and a lot of people should have something really good going for them.

BPE

The Engineer's Field Report

CASE HISTORY
RPM Delo Oils
LUBRICANT
Progressive Transportation Co, Compton, California
FIRM

RPM DELO holds piston wear to .001" after 201,253 miles of on-and-off highway hauling



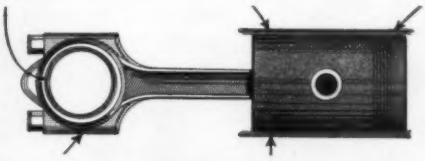
LUBRICATED WITH RPM DELO Oil, these engine parts were pulled from a Cummins HR diesel after 201,253 miles. A portion of this mileage was put on during four months of rugged service spotting loads of heavy pipe in the Arizona desert. When the engine was taken down, after two years of this on- and off-highway hauling, Progressive Transportation Co. found RPM DELO Oil had kept lacquer, gum, sludge, and deposits from forming...rod bearing wear varied between .0005 and .001 inch and pistons showed maximum wear of only .001". No wear at all evident on main bearings. Progressive Transportation uses RPM DELO Oils in all its large fleet of tractors—some of which have traveled well over 200,000 miles without overhaul.

Why RPM DELO Oils prolong engine life

Special compounds stop corrosion

Anti-oxidant resists lacquer formation

Detergent keeps all parts clean



Metal-adhesion qualities keep oil on parts in running or idle engines—inhibitor resists foaming

LUBRICATING OILS RPM DELO

For More Information... about this or other petroleum products of any kind, or the name of your nearest distributor, write or call any of the companies below.

STANDARD OIL COMPANY OF CALIFORNIA, San Francisco 20 • **STANDARD OIL COMPANY OF TEXAS**, El Paso
THE CALIFORNIA OIL COMPANY, Perth Amboy, New Jersey • **THE CALIFORNIA COMPANY**, Denver 1, Colorado

highlights

Present ceramic coatings enable metals to stand up to 3000°F for short periods, reports a Bettinger Corp. spokesman. New coatings on advanced metals are predicted for temperatures to 5000°F. Other coating uses are as protective agents against rust and corrosion, shock, abrasion and fatigue.

By 1980, a 300% increase in the nation's electric utility installed capacity will be needed, according to the Federal Power Commissioner. Present installed capacity of 128.7-million kw will have to be expanded to 394-million kw. There is great potential here for use of mobile diesel power units to solve a lot of the problems arising from expansion and wider distribution.

A mechanical variable-speed transmission under development is based on a new concept. According to the Armour Research Foundation of Illinois Institute of Technology, where the work is being done, it is to be: suitable for both high and fractional horsepower; positive in action; insensitive to torque fluctuations; capable of output speed delivery variable by minute increments from the unit's maximum value to zero.

Garrett Corporation's development program has been intensified by establishment of a new 5-man research board. The new board will review and coordinate all Garrett research activity, maintain long-range studies, lend assistance in planning and in work process and keep abreast of current requirements for all equipment made by Garrett. The company credits research as the greatest factor in their 22 years of success and growth.

It would make good economic sense for railroads to enter the pipeline business, contends E. H. Schmitt a prominent Oklahoma civil engineer. Railroads own thousands of miles of rights-of-way along routes that future pipelines would logically follow. Rights-of-way previously acquired, paid for and available for immediate construction, would be a great asset to a pipeline company. Leasing of these rights-of-way or part ownership in the pipelines on their property would be a great asset for railroads.

Trucks will carry more U.S. mail if new legislation before Congress became law. The bill, patterned after the Railway Mail Pay Act, is reported satisfactory to the Post Office Department by George Siedle, Assistant Postmaster General.

Purchases of truck-mounted cranes, mostly diesel, hit a new high in 1957. In 1955, truck crane purchases represented 23% of all shovels and cranes made in the U. S. This demand increased to 28% in 1956 and in the first 10 months of 1957 it jumped to 36%.

The world's record for deep drilling has been broken near Ft. Stockton, Tex., by a National Supply type 130 rig operated by the Phillips Petroleum Co. The former record of 22,570 ft was passed and the rig, powered by three LeRoi L-4000 natural gas engines, when last reported was still drilling.

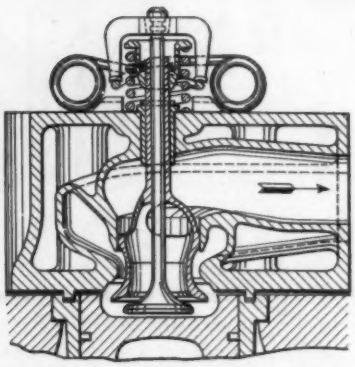
High capacity, high speed and handling ease of today's construction is credited by W. J. Klein, V-P of Allis-Chalmers, for holding current cost of moving a yard of dirt to an average of about 30 cents. He also pointed out in a talk to Texas bankers that back in the days of silent pictures and 5 cent cigars, it cost about the same. Yet during this period the general price index is up about 265%.

European railroads are benefiting through international pooling of freight cars to reduce empty runs. "EUROP" is the symbol of pool equipment. These cars handle three-fifths of the freighting in Western Europe and the project has reduced empty runs by 50%. EUROFIMA is an outgrowth, a cooperative finance organization for purchase of locomotives and other rolling stock.

It's not always red tape that snarls road construction. Breeding activities of mink stopped construction of a 5-mile section of toll way near the Wisconsin border from February 1 to July 15, according to the Allis-Chalmers "Reporter". Noise poses a serious threat to the mink breeding activities. A toll way spokesman reported this to be the third delay caused by mink farms. Mushroom and onion farms have caused situations, too, but for far less delicate reasons.

Telescopic Valves — A Different Concept

Tests of a new idea in engine valves designed by Dr. Buchi, father of turbocharging, show improvement in 4-cycle engine performance. Here are details of the valve system, how it works and what it promises.



Position of telescopic valves are seen in the combustion chamber with the piston at TDC on the scavenging stroke. Contour of outer valve gives intake air smooth motion. Exhaust escapes through annular space between valves. Seal at upper end of outer valve seals the intake air passages from the exhaust passages in the cylinder head.

DR. BUCHI first showed how to provide more air for the diesel engine by turbocharging. More recently, he turned his attention toward a more efficient method for getting this air into the engine cylinder and utilizing it better after it was there. The result is the Buchi Telescope Valve System.

Potential output of any engine design is fundamentally limited by its breathing capacity. Modern turbocharging techniques can supply all the air required but the next problem is to get it into the cylinder. Then there is the matter of "swirl" or turbulence to get intimate mixing of the air and fuel. Finally, combustion gases must be exhausted and scavenged completely.

Poppet valves, as currently used on 4-cycle engines, are becoming an increasing problem as cylinder outputs are increased. At high diesel compression ratios, space alone is a factor, limiting valve size, lift, and in many combustion chamber designs, necessitating cutouts in the pistons for clearance. Compromises must be made in the chamber design and cylinder heads become more complicated.

These and other problems are daily facing designers and are being met with a remarkable degree of success despite the many obstacles. However, rather than refine existing designs, Dr. Buchi took a new approach—the telescope valve together with several related features.

Describing The Telescope Valve

Illustrations show the general configuration of the telescope valve. This coaxial assembly consists of an inner and outer valve. The inner valve is conventional and is free to slide within the hollow stem of the outer valve and has its seat in the outer valve's head.

The outer valve, with its hollow stem, also has a hollow body of bell and semi-spherical shape. In the semi-spherical part are holes to permit flow of gas through its body when the inner valve is open. The body's outer diameter has this valve's face at its inner end and a sealing land at the outer end. This outer valve face seats against the cylinder head. The seal area, matching a bore in the cylinder head, serves to keep the intake and exhaust gas passages separate.

Each valve can be actuated independently. However, it can be seen that when the inner valve is closed, the outer or inlet valve carries the inner valve seated therein, with it. The whole valve assembly is placed in the cylinder head on the axis of the cylinder bore. The valve-actuating gear is modified to obtain the desired movement of the two concentric stems.

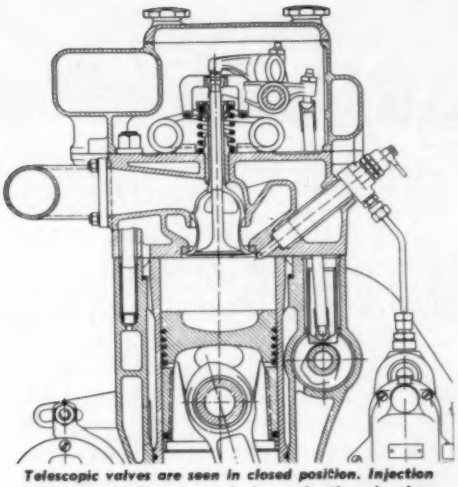
Functioning During a Cycle

While design of this mechanism is a nice engineering job in itself, its significance goes beyond just being a different kind of valve. It's what the valve permits that can be so important.

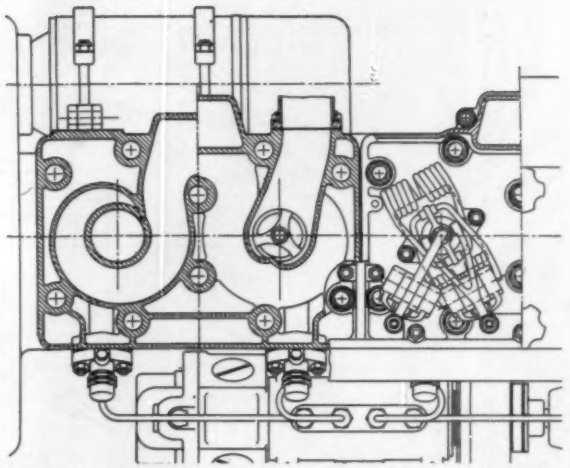
Before getting into details, it should be made clear that we are dealing with a concept rather than a frozen design as might be inferred from the illustrations. Various arrangements are possible so long as basic principles are not violated. Dr. Buchi also points out that the system can be applied to internal combustion engines of any size, configuration and type.

The coaxial valves are located on the cylinder axis right above a concentrated combustion space. Both valves can use this cavity during lift. This dual use of available space means that large valves can be used, they can have good lifts and be open longer. More air can get in and scavenging be more complete. A comparison of valve area to swept volume for the telescope valve versus a conventional engine is shown.

Air can be admitted around the outer valve and exhaust gas discharged through the inner annular space between the two valves. Ducting in the cylinder head as well as combustion chamber design also aid in obtaining excellent volumetric efficiency, more complete scavenging and intense swirl.



Telescopic valves are seen in closed position. Injection valve is located at an angle in combustion chamber.



Spiral continuation of intake ducting is seen at left, split flow exhaust ducting in center, and valve rocker arm and spring arrangement at right.

Preferably, air is admitted by an inlet duct with a spiral-type continuation right to the inlet valve seat. High swirl velocity tends to improve fuel distribution and atomization, scavenging action and the cooling of combustion space and valve surfaces.

The combustion chamber can be much smaller than the piston diameter. A typical shape is shown. Note that it is symmetrical, the need for cutouts for valve clearance having been eliminated. Preferably, its major volume should be in the less-cooled piston crown to minimize heat losses. The remainder of the piston crown provides a substantial "squish" area that also promotes turbulence.

Valve location necessarily displaces the fuel injector to the side. Orifice angle is arranged to spray across the flattened chamber. It may also be directed to one side to spray in the direction of swirl movement of the air. One injector is generally used in most engines; two or more may be used in large-bore engines.

Mixing action is so effective that a relatively low injection pressure is adequate. Also, a single-hole nozzle is normally used. A single large orifice offers both cost and maintenance advantages.

Combustion progresses rapidly and completely in the completely symmetrical chamber. Relationship of chamber surface to volume is very low. Consequently, little heat energy is lost to chamber walls. This fact is reflected in reduced fuel consumption.

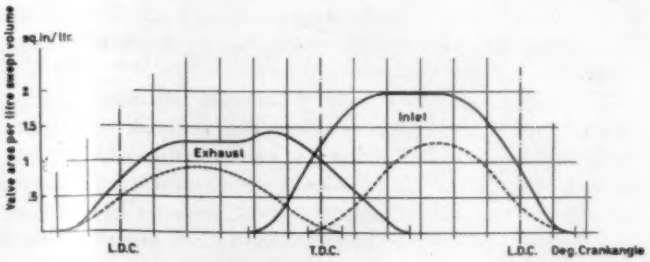
Symmetry of the entire system has an additional effect. There are uniform thermal and pressure stresses within the cylinder. There are no troublesome "hot spots" and tendencies to crack or distort are reduced.

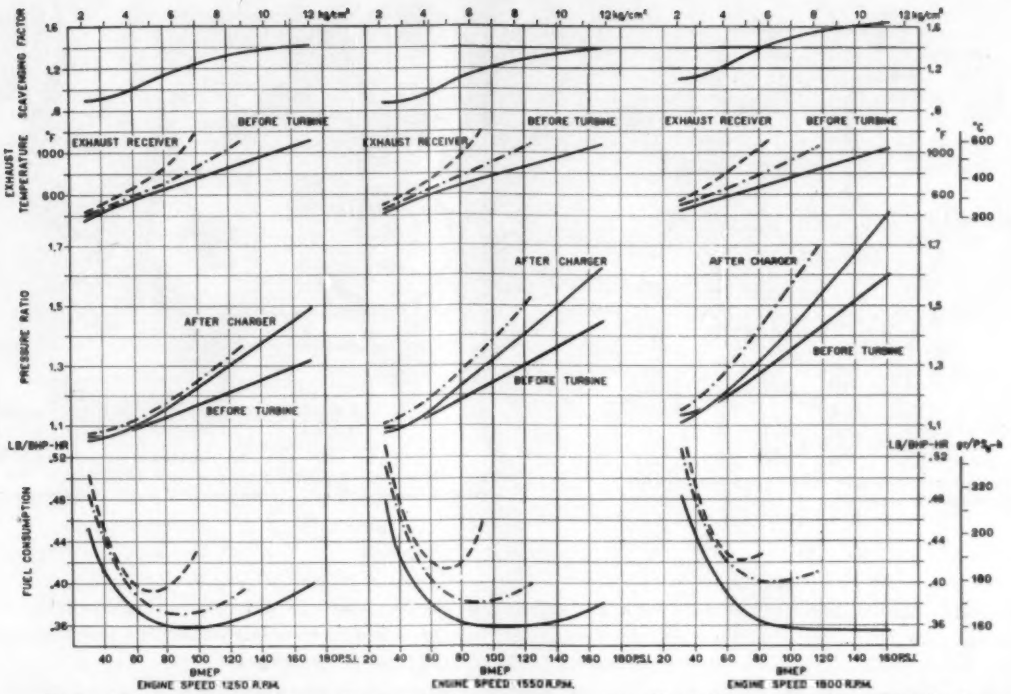
Scavenging efficiency is excellent. Ducting, valves, and combustion chamber walls provide a smooth, guided passage for scavenging air. Substantial overlap periods are attainable even in the highest-speed engines.

Air entering, say, past the outer valve, is guided by the chamber walls through the chamber and back out the annular passage between the valves. There are no pockets or dead spaces in which combustion gases can remain. The whole combustion chamber is swept clean and also cooled.

When exhaust gases exit between the valves, it is desirable to give the outer valve body a bell shape to improve flow and minimize pressure and heat losses. Gases exit through openings in the semi-spherical top of the valve body. If desired, ribs or wall parts can be shaped so as to use some of the gas energy to rotate the outer valve, thus distributing wear evenly.

Solid line indicates telescopic valves action, dotted line, conventional valve action. Additional area of telescopic valves plus their greater overlap as compared to conventional valves results in greater volumetric efficiency. Rise in solid line before the exhaust valve starts to close, is due to intake valve starting to open.





Curves show the specific fuel consumption as a function of bmep, pressure ratios in blower and turbine, and exhaust temperature and scavenging factor, all at three different engine speeds for: - - - - - normally aspirated conventional engine - . - . - . - turbocharged conventional engine; and ——— Buchi telescopic valve-equipped turbocharged engine.

The cavity surrounding the top of the valve body and the ducting is arranged for smooth flow of the exhaust gases to the manifold.

Some Results

Buchi's telescope valve system has been tested over a long period and results compared with equivalent engines using various conventional combustion systems. Tests also included naturally-aspirated, mechanically-blown and turbocharged operation. Performance data submitted by Dr. Buchi indicates superiority of his system in many important performance areas.

In terms of importance to engine users, fuel consumption is a good start. Combustion chamber efficiency, including reduced heat losses, contribute to this. For example, in a 6-cyl, 4.33-in. by 5.9-in. engine at full load turning 1800 rpm, the lowest consumption was 0.355 lb per bhp hr. Bmep was 160 psi.

Higher specific outputs are indicated in view of the improved breathing, including good scavenging. Lower and more uniform thermal stressing permits a higher degree of supercharging without exceeding the limits of commonly-used engine materials.

Dr. Buchi also makes a point of improved reliability. His analysis of both mechanical and thermal loads on the telescope valve indicates that they are lower than with conventional systems. With the piston design used, rings are shielded from the full effects of peak pressures and temperatures and operate at even temperatures around their circumference. Also, effectiveness of scavenging reduces piston head temperatures. Low injection pressures reduce pump loads and single large nozzle orifice, commonly found only in precombustion chamber engines, is less sensitive to deposits and fouling.

While the valves and their gear are somewhat more complex than conventional designs, Dr. Buchi feels that this is well compensated by simplification of head design and manufacture. The only openings are the relatively large central bore into which the intake and exhaust passages lead, and the hole for the injector. Complexity of coring and machining is therefore reduced.

Low cooling losses from the combustion chamber mean a higher final temperature after compression and thus quicker starting. Combustion is reported to be initiated smoothly and without combustion knocks.

Conclusion

When will we see engines incorporating the telescope valve system? We don't know. It took time before Dr. Buchi's earlier and important contribution to diesel technology—turbocharging—reached the status it enjoys today. You can bet, though, that there will be a lot of figuring and evaluating going on in various engineering departments.

Any development that offers the potential of improving volumetric efficiency, specific output, and thermal efficiency with reduced and absolutely symmetrical and uniform thermal stress cannot be overlooked for long.

3 dependable products for the diesel industry

DE LAVAL IMO PUMPS

De Laval IMO pumps do a dependable job during long years of service. The reason is IMO design simplicity. De Laval IMO's have only three moving parts—smoothly intermeshing rotors that propel the fluid axially in a steady flow without churning, pocketing or pulsation. There are no reciprocating parts to wear or become noisy. Quiet, compact IMO pumps are excellent for direct-connected, high-speed operation. They can be furnished in capacities to 1,000 gpm and pressures to 1,500 psig.

DE LAVAL HYDRAULIC FAN DRIVES

De Laval Hydraulic Fan Drives for air cooled heat exchangers and cooling towers offer these important advantages. They *save* power since the fan operates at full speed only a portion of the time. They provide *accurate, automatic* control of engine jacket water temperature, and also assure complete operational flexibility. These units stay on the job for years. As shown, both IMO motor and speed reducer are mounted and factory aligned on a single bedplate.

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De Laval turbochargers offer pressure ratios of 3:1 as well as higher compressor and turbine efficiencies than those found in conventional turbocharger systems. Output of heavy duty diesel, gas and dual-fuel engines may be doubled by De Laval turbochargers without increasing thermal loading. Exclusive Monorotor design offers a compact lightweight unit of sturdy construction. De Laval turbochargers are self-adjusting to engine loads, can be used on 4- *and* 2-cycle engines.

You'll find additional data in these De **Laval** *Bulletins. Write for your copies.*

DE LAVAL

Steam Turbine Company

TRENTON 2, NEW JERSEY

Conversion to diesel power is completed, jeep has been tested and it is now ready for being lowered into the mine. The 23½-gal batch-type exhaust gas conditioner with an exhaust gas dilution system is seen between the bumper and radiator grill.

Dieselized Jeeps Go Underground

Converted to diesel power, jeeps are a tough, practical vehicle for hard service. Here, with the application of an exhaust scrubber, is their adaption for one service—underground, non-coal mine use.

JEEPS have gone diesel and have gone underground. Credit for this goes to Waukesha Sales and Service, Inc., of Houston, Texas. Their Engineering and Service Dept., headed by Bill Ball, has converted the conventional gasoline engine powered Willys jeep to diesel power. This unit has been designed primarily for, and meets the Bureau of Mines specs for use in "non-coal" mines.

Nearly 40 of these WJ-180 conversions are already in mine service. Among the users are National Potash Co., International Minerals and Chemical Corp., and Duval Sulphur and Potash. Satisfactory and economical operation of these units has created such a demand for them, that the Waukesha Sales branch in Hobbs, N.M., has become a jeep distributor.

However, use of these diesel-powered jeeps is by no means limited to non-coal mines. They are being sold for many other applications. Thus, the modifications made during the conversion depends on the application. The changes emphasized here, will be those for converting a jeep for underground use.

Jeep Modifications

The jeeps converted are the Willys Models CJ-5 and CJ-6, well known for their ruggedness and versatility. These units have all-steel bodies, 4-wheel hydraulic brakes and 4-wheel drive. The CJ-5 has an 81-in. wheel base, the CJ-6, a 101-in. wheel base.

Although some body alterations were made to adapt the jeep for this service, no changes were necessary on the chassis or drive line components.

When the jeep is intended for low-ceiling service, such as in mines, the operator's seat is lowered. This is done by moving the fuel tank and altering the jeep floor and bed. Body and frame alterations can be done best while the chassis is stripped. The steering column is shortened. The tool box is removed and a 10½-gal fuel tank is put in its place.

No major structural changes were necessary to install the diesel. It dropped right into place in the space vacated by the gasoline engine. The diesel, a Waukesha Model 180-DLC, 4-cyl, 4-cycle, engine with a bore and stroke of 3½-in. by 3¾-in. is limited to a maximum operating speed of 1800 rpm. At this speed, it develops about 28 hp. Its displacement is 144 cu in.

Some features of this engine include intake and exhaust valves which are stellite-faced for long life. Pistons are made of aluminum alloy and use five rings. The crankshaft is counterbalanced and hardened. Both main and conrod bearings are steel-backed, copper-lead precision

Jeep is seen with gasoline engine removed prior to conversion to diesel power. No alterations were necessary on chassis or drive line components to install the Waukesha diesel. Transmission seen is that furnished on standard Willys jeep.

The Waukesha Model 180DLC diesel is being positioned for installation. This 4-cyl, 28-hp engine dropped right into the space vacated by the gasoline engine. No special parts were used in the engine or the jeep. Parts replacement will be a routine matter.

type. Wet liners are used. The injection system consists of an American Bosch, single-plunger pump with built-in governor, drawn-steel injection lines, pintle-type nozzles and an emergency shut-off valve.

Clutch, transfer case, transmission, drive shafts, axles, etc., remain as furnished on the standard Willys jeep. The clutch is a single, dry-plate type with torsional damping. A dual ratio, 1:00-1 and 2:46-1, selective rear wheel or 4-wheel drive is used. Transmission is a 3-speed synchromesh type.

A heavy-duty, 12-v electric system is used for starting the diesel and operating glow plugs in cold weather for easier starting. The electrical system for lights, etc., is beefed-up and protected by fuse blocks. Guards are placed on lights as necessary.

Conditioning Exhaust Gas

To prevent possibility of explosions and build-up of toxic gases in a mine, rigid specs are set by the Bureau of Mines. Both mine and vehicles working in it must conform to these requirements. For example, for a "non-coal" classification mine, the material being mined must be incombustible or contain at least 65% (by weight) of incombustible material. Also, the underground atmosphere in any open workings must contain less than 0.25% (by volume) of flamable gas.

Amount of fresh moving air where a vehicle is working, must be 2600 cfm or more, per unit. This ventilation must be in addition to that required for other machinery.

The diesel, with its least-toxic exhaust and non-flamable fuel, is a logical choice for underground use. Its exhaust gases are further cleaned up by close control of fuel to air ratio and scrubbing as well as cooling of the gases before exhausting into the mine.

To control air/fuel ratio, definite specifications are given to prevent air intake restrictions of any kind—a good policy with any engine. Proper adjustments of the injection system and governor are also a large factor in controlling air/fuel ratio.

For minimizing carbon monoxide in exhaust gases, a 23½-gal, batch-type exhaust gas conditioner with an exhaust gas dilution system is used. This was designed by Waukesha Sales and Service, Inc., in conjunction with the Bureau of Mines, and is built by them. With use of this scrubber and diffuser, the exhaust system will not produce over 0.25% (by volume) of carbon monoxide throughout the engine's load-speed range.

This arrangement actually scrubs the exhaust gas of any sparks, and at the same time the carbon monoxide in the gases is oxidized. The resulting gases are then passed through a diffuser tube that places them in the air stream of the engine fan under the jeep. This air stream in turn disperses the gases to the rear of the jeep. When the exhaust gases leave the conditioner, they are free of sparks and carbon monoxide and are non-toxic.

The conditioner functions with low back pressure on the engine since maximum pressure drop through the exhaust system at full throttle, no load, (1800 rpm) must never exceed 18-in. of water.

The stainless steel exhaust gas conditioner is mounted between the radiator and the jeep's bumper. The bumper is moved forward to make room for the unit. Flexible tubing connects the engine to the scrubber and the scrubber to the diffuser. All connections must be super-tight to prevent leakage.

Affecting both safety from fire and explosion and also exhaust gas characteristics, the Bureau of Mines regulations also specify certain fuel characteristics and handling procedures. The fuel's flash point must not be less than 140°F and sulfur content no greater than 0.5% by weight. All necessary precautions must be taken to keep it clean and free of dirt and water. When filling the tank underground, fuel must be carried in strong, tight metal containers with positive closing devices. These fuel containers

TABLE I

Altitude: feet above sea level	Maximum fuel injection Rate in lb per hr. 1500 rpm	1000 rpm
1000	10.6	8.2
2000	10.2	7.9
3000	9.9	7.6
4000	9.5	7.3
5000	9.1	7.0
6000	8.8	6.8
8000	8.1	6.3
10,000	7.5	5.8
12,000	7.0	5.4

must be stored in well-ventilated compartments made of incombustible materials.

To be on the safe side, the normal fuel filters used were backed up by additional filtration. While protection of injection equipment with its reduction in maintenance is always desirable, it is particularly important in this service. Condition of injection equipment is a big factor affecting completeness of combustion and therefore composition of exhaust gases.

Service and Replacement

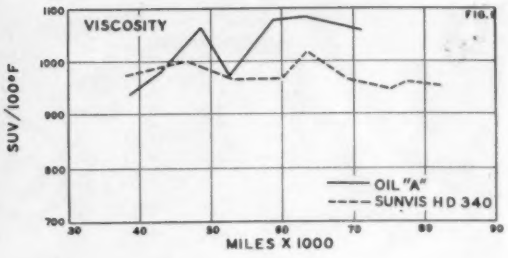
No special parts are used in either the engine or the jeep. Parts replacement and maintenance will be a routine matter, available in all areas. Special care must be taken however, that the new parts are exactly like those furnished by the manufacturer of the original equipment. This is specifically stated in the Bureau of Mines regulations.

The reason is clearly seen in the case of injection system components. Not only must they be exact duplicates to avoid changes in injection characteristics, but settings must also be duplicated. Maximum fuel injection rate must never be changed. (See Table 1) This also goes for any fuel settings on the pump and other adjustments affecting air/fuel ratio. Once properly set, these adjustments and the governor settings must be sealed, under U. S. Bureau of Mines regulations.

The exhaust gas conditioner must be drained, flushed and inspected at regular, frequent periods and cleaned when necessary. It must be filled to its operating level with clean water at the beginning of each shift.

None of the jeeps have operated long enough to need overhauling, so no actual repair data is yet available. However, any overhauling or repairs will be made in a shop underground. Once the jeeps are dropped down the mine shaft on a hook and cable, they generally never come out again. All repairs are made in this shop.

Since emphasis is on mine safety, frequent inspection must be made to see that all engine parts, electrical components, etc., are in safe operating condition. No leaks of any kind are tolerated on any system of the engine or jeep. All fuses or overload protection in the electrical circuits must be maintained in approved condition. Furthermore, no changes can be made in any part of the equipment without prior approval from the Bureau of Mines.



Better Lube Oils Through Research and Test

SUN Oil Company's new lube oil, Sunvis HD340, is designed for new, higher-hp locomotive diesels. It is also intended to replace conventional lubricants in older locomotives. Sunvis HD340 has been given extensive laboratory and road tests where it is said to have been compared with oils of highest quality. As a result of these tests, it is claimed to give savings in engine maintenance and lube oil costs.

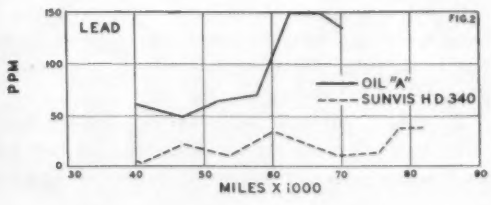
In laboratory engine test using a high sulfur-content (1%) fuel, the HD340 is said to have maintained a higher degree of engine cleanliness than a conventional oil.

An HD340 road test is said to have been run 80,000 miles in freight service. Two diesel units in tandem were reversed at regular intervals. One was charged with HD340, the other with a high-quality railroad diesel oil. No oil change was made in the locomotive using the HD340. Results from oil inspections are shown in Fig. 1 and 2.

Fig. 1 shows HD340 viscosity remained almost constant. Oil "A" viscosity increased about 10% beyond original level. Corrosion and wear results in Fig. 2 show lead content of oils. Reference oil rose to the danger level of 150 ppm and was changed at 70,000 miles.

Alkalinity tests showed HD340 maintained a positive alkaline reserve. Tests for additive showed no depletion. Pentane insolubles stayed below 0.2%, showing oil had filterability.

At the end of 80,000 miles, the following were reported in the engine with HD340: clean pistons; groove filling less than 40% by volume; no deposits under crown; air ports less than 10% restricted; no liner scuffing or ring sticking. Railroads are expected to reduce lube oil purchases by 10% when using HD340.



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Designed by Edwin E. Bly and produced by Diesel Dials, Inc., this new time saving instrument gives rating and application characteristics of all diesel and natural gas engines manufactured in the United States.

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A stickler among all engines is the question of ratings — the dial indicates all combinations of BHP, BMEP and RPM for every engine listed. Solutions are graphic and can be read directly.

No special skills are required to use the computor other than a cursory knowledge of diesel engines.

Packaged in a compact, handy envelope with complete instruction manual, this 10″ dia. instrument fits conveniently in a brief case. Constructed similar to a circular slide rule, of durable plastic resistant to moisture and humidity. As an added advantage the logarithmic scales are arranged for solving any multiplication or division problem.

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Cerlist's Model 3—First of Five Planned

Now entering production, Cerlist's first model is a high-speed, high-output, 2-cycle diesel. Lightness results from liberal use of aluminum; compactness from application of the loop-scavenging principle.

Fan-to-flywheel Model 3 Cerlist diesel has a vehicular rating of 85 hp at 3000 rpm and weighs 605 lb. The other side of engine is free of equipment except for fuel pump and starter.

A NEW diesel engine is going into production. It is interesting from several new points—from its design, its characteristics, and its capabilities. It is the Cerlist Model 3, first in a projected line of five models ranging from 55 to 225 maximum brake horsepower.

The Model 3 is a high-speed, high-output, loop-scavenged 2-cycle diesel engine. This model has three 4-in. bore cylinders. Originally, designed for a 4¼-in. bore, it is being produced at the smaller diameter to provide a high factor of design safety. Total displacement is 170 cubic inches.

Rating for continuous duty is 65 hp at 2600 rpm; for intermittant duty—75-hp at 3000 rpm; and for automotive duty—85 hp at the same 3000 rpm. This justifies the term "high-speed" and its low weight to power ratio and its high output per unit of swept volume justifies the term "high-output."

Breaking down the ratings in relation to the 605-lb fan-to-flywheel engine weight and the 170-cu in. displacement, we get:

	Continuous	*Intermittant*	*Automotive*
Lb per HP	9.3	8.07	7.12
HP per CU IN	0.382	0.441	0.5

Liberal use of aluminum accounts for part of the weight reduction. Simplicity inherent in loop-scavenged engine design is also responsible. Elimination of valves and their actuating gear not only tends toward weight reduction but also promotes greater compactness.

Cerlist sees application of these engines wherever high output, low weight and compactness are desirable. They are recommended for automotive applications and for all types of portable equipment. For use in tractors, lift trucks and similar machinery where torque converters are often used, the torque-speed characteristics are considered particularly suitable for such hydraulic drives.

Design Background

Users want effective, economical horsepower. Ordinarily, they are not particularly concerned how it is produced. This is up to the designer. There are several approaches to the problem and different schools of thought. One is to get more horsepower by increasing the number of power strokes per unit of time. A second, as typified in 4-cycle engine design, is to increase the output per power stroke.

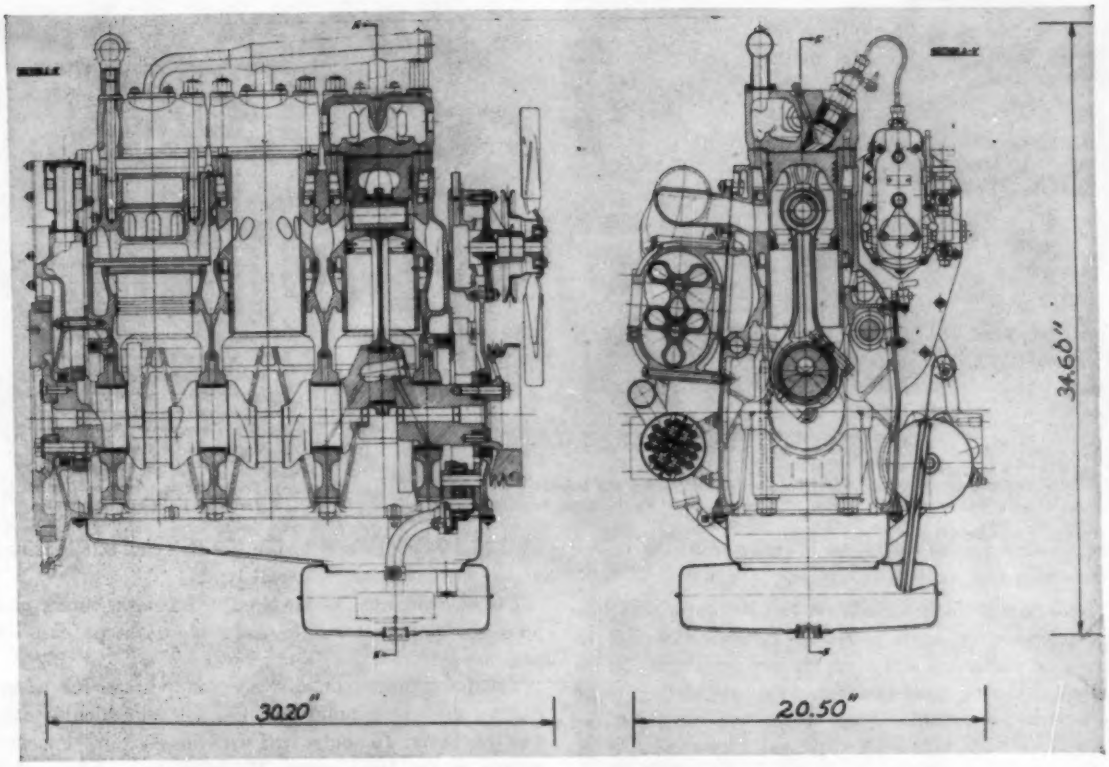
Prof. Dr. Hans List, designer of the Cerlist engines, chose the first method to obtain a high output engine. He elected to increase power strokes per unit of time by utilizing the 2 cycle principle and raising the crankshaft speed. For maximum simplicity and a minimum of moving parts, loop scavenging was selected.

At continuous speed rating, the Cerlist engine delivers 2600 power strokes per minute. A typical speed for a 4-cycle engine in this horsepower range is 1800 rpm. Power stroke ratio in this case is 2.89, favoring the 2-cycle engine. However, effective stroke of a 2-cycle engine is reduced by the port area and in the engine only 65% is effective. So full apparent gain cannot be utilized.

Examples of typical gains in effective power strokes per minute for the comparison above are illustrated. This increased rate of power delivery gives the 2-cycle engine a big edge that can only be offset by much higher cylinder pressures in the 4-cycle unit.

Loop-scavenged two-cycle engines in general and high-speed engines of the same type in particular are faced with two major problems—(1) port design for maximum scavenging efficiency and (2) control of cylinder lubrication. By solution of these problems, Prof. Dr. List achieved the engine's high performance and made the high crankshaft speed commercially feasible.

Theoretical solution, confirmed by thousands of experiments, showed the best placement and shape of the intake and exhaust ports. The result was high scaveng-



ing efficiency, despite the short time interval available for the process.

Controlled distribution of lube oil over the whole liner area swept by the piston rings involved a combination of piston and ring design together with design and surface finish of the liner. Good oil distribution and retention starts right at break-in as the result of bonderizing the liner walls. Thereafter, design provides dimensional stability under all operating conditions to give uniform contact between piston rings and liner wall.

The liner is slightly barrel-shaped at the port area to relieve the higher ring bearing pressures and prevent scuffing. The oil rings, operating below the ports in an area of low wear, are effective for long periods in controlling oil consumption.

Engine Details

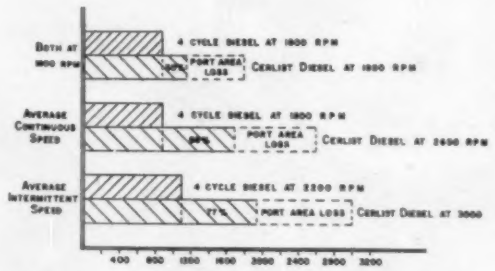
External appearance, general arrangement and many details are seen in the illustrations. Major aluminum alloy components and those made of ferrous metals are separately illustrated. This gives a good visulization of the percentage of aluminum used.

Weight reduction is one big reason for its use but another should not be overlooked—its excellent heat conductivity, approximately four times that of cast iron. This is important for good cooling. Even the surface cooling effect on these engines is significant.

Features of major components will be discussed briefly, starting with the aluminum cylinder block. It is internally ribbed to carry stresses from the individual cylinder heads down into the main bearing area. The block is deep, extending well below the crankshaft centerline, for rigidity to prevent warpage and distortion. Deep main bearing caps are also made of aluminum alloy.

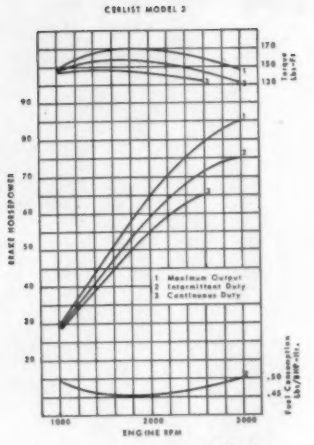
Cylinder heads are aluminum. Design is simple since valves and their related gear have been eliminated. They have high resistance to thermal stresses and are well suited for the higher supercharging planned for future V-4, V-6 and V-8 engines in the series.

Pistons are also aluminum. There are four compression rings and two oil control rings. The flat crown provides high strength and reduces the combustion space to achieve the high compression ratio of 22:1. Pistons


BOTH AT 1800 RPM
4 CYCLE DIESEL AT 1800 RPM
PORT AREA LOSS
CERLIST DIESEL AT 1800 RPM
AVERAGE CONTINUOUS SPEED
4 CYCLE DIESEL AT 1800 RPM
PORT AREA LOSS
CERLIST DIESEL AT 2650 RPM
AVERAGE INTERMITTENT SPEED
4 CYCLE DIESEL AT 2200 RPM
PORT AREA LOSS
CERLIST DIESEL AT 3000
400 800 1200 1600 2000 2400 2800 3200

Effective power strokes per minute per cylinder of Cerlist engine at various speeds is compared to those of typical 4-cycle unit.

Ferrous parts of Cerlist Model 3. Liner, conrod, timing and balance shaft gears will be interchangeable with future model Cerlist diesel engines.



Performance curves of Cerlist for three types of service.

are oil-cooled from below by a spray from the drilled connecting rod.

Rods are of forged steel. So are the caps and these are joined at an angle to reduce big-end width for removal of piston and rod assembly through the top of the cylinder. Mating faces of rod and cap are toothed to insure accurate location. These caps, and main bearing caps as well, are held by heat-treated, high-tension bolts.

A heavy steel wrist pin bears in a bronze rod bushing. The bushing is grooved to permit substantial oil flow for pin lubrication and has a slotted passage for oil flow to the spray orifice.

The wet cylinder liner is a heavy-duty ferrous casting with six inlet and three exhaust ports. Water passages are provided between the ports and through the top flange. Four O-rings seal water spaces from the air inlet and exhaust passages and the crankcase.

Cast nodular iron was used for the crankshaft. This material offers high resistance to torsional vibration due to its high damping factor and also has high resistance to shock. There are four main bearings, 3.5-in. in diameter. Rod bearings are 2.87-in. in diameter. All bearings are of the precision, tri-metal type.

Use of aluminum is extended to oil pans, covers and housings. Both automotive and industrial-type cast oil pans are available.

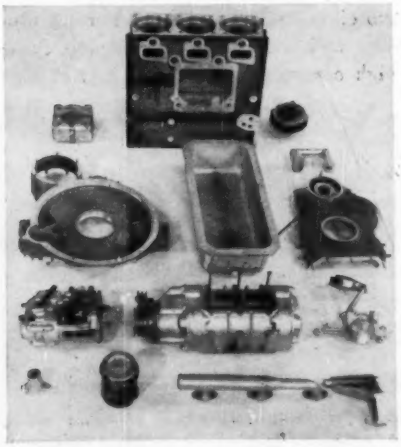
The front cover contains a cored passage for water flow to the water pump housing, half of which is cast into this cover. The outer half with the shaft and impeller mount on the front cover. The cooling fan is co-axial with the water pump and is driven by a vee-belt from the blower.

A pocket in the front cover is provided for the counter weight on the balance shaft. This balancing system offsets inertia forces to provide operation free from vibration at any speed. The shaft is gear-driven from the flywheel end of the engine.

The cast flywheel housing is secured to the block through a steel plate. This plate also serves as a mounting for the Robert Bosch fuel injection pump.

A design objective was to eliminate external piping to the highest possible degree. The water passage is one example; another is seen in the lube oil system. The

(*Continued on Page* 40)



Aluminum parts of Cerlist Model 3. Cylinder head and piston will be interchangeable with future models of Cerlist diesel engines.

The Willys Forward Control "Jeep" FC-170 is one test application for the Cerlist. From left to right are: G. Wald, plant supt.; M. B. Long, president and treasurer; R. C. White, v-p in charge of sales.

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Average miles per unit per month.....6,800
Average fuel consumption per unit mile..... .59 gal.
Average lube consumption per 100 unit miles....1.39 gal.
Average mileage between engine overhauls.....175,000

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Boston-bound commuters board the 8:18 (AM) B & M Highliner at Hastings, Mass. Schedule for the 27-mile run is 50 minutes.

(*Continued from Page 38*)

gear-type pump is gear-driven from the front end of the crankshaft. Cored passages lead to a mounting bracket for the full-flow filter. It is also possible to flange-mount a tubular oil cooler on this bracket.

Combustion System

A Roots-type blower provides adequate air for smoke-free combustion even under severe conditions. It is driven by two vee-belts from the crankshaft pulley. Excess air delivered assists in producing the high scavenging efficiency which, although not quite as high as the uniflow scavenging system, has the advantage of being achieved without use of valves. A secondary effect is the considerable lowering of exhaust gas temperatures.

The stainless steel pre-combustion chamber used in conjunction with pintle-type nozzles makes the system relatively insensitive to fuel grade variations. Gases existing from the chamber orifices during initial burning produce a high degree of turbulence in the combustion space.

The transverse cross section shows the present location of the pre-combustion chamber and nozzle. Recent design advances dictated this change from the location seen in the photograph of the cylinder head.

The 22:1 compression ratio promotes easy starting and because of reduced ignition lag, quieter running. Also, glow plugs assist in cold-weather starting. A 12-v electrical system is used.

Performance Testing

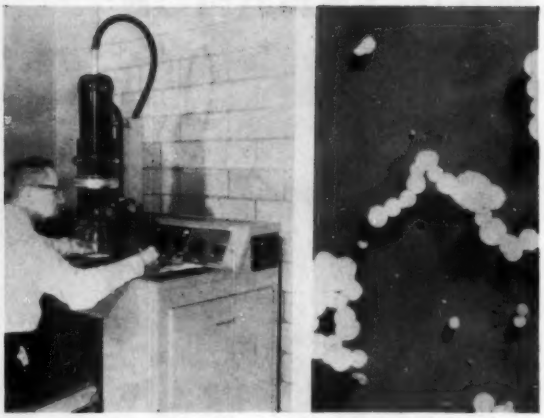
Performance curves for the Model 3 are shown. Properly rated for the particular service, these engines have broad application. Test engines have demonstrated their capabilities in such widely-diversified service as irrigation pumping, powering a saw mill and as motive power for a 7000-lb GVW truck.

As pumping loads are relatively constant, the engine was rated at the 2600-rpm continuous rating. The unit delivered approximately 750 gpm at 1000 psi at the pump. Fuel costs under these conditions were approximately 38 cents per acre-inch.

When powering the 48-in. saw mill and edge trimmer, the engine ran between 2500 and 2800 rpm. Rating was on an intermittent basis as the saw was in the log only 40% to 60% of the time.

Automotive rating was applied to the engine installed in a Willys Forward Control "Jeep" FC-170. It was installed without change in drive-line components and replaced a 226-cu in. gasoline engine. Ability to meet the varying load-speed combinations of this service is shown by the operators' reports that performance was at least equal to that with the gasoline engine. Top speed is 62 mph. Yet consumption of a cheaper fuel was substantially less.

On the basis of all information to date, it seems likely that the Cerlist Model 3, due to its versatility, simplicity and physical specifications, will find many applications in the broadening field of diesel usage.



Electron Microscope Helps RR Select Economy Fuels

AN electron microscope is solving tough railroad problems. This new Norelco EM-75 unit, helps the Chicago Rock Island and Pacific RR Co. to decide promptly whether to buy economy fuels when available. It also assures them that delivered fuel measures up to the approved sample.

Rock Island buys about 85-million gallons of diesel fuel annually. A saving of as little as 1/8 cent per gallon, amounts to $100,000 a year. Since the railroad does not buy to a definite specification, constant vigilance is necessary to make sure that fuels meet certain basic requirements. The electron microscopist is especially concerned with solid particles both in the liquid fuel and combustion products.

Particle size is important because it affects filter life. In some cases, particles agglomerate in storage to form chains or globs which plug filters. Other fuels are unstable at higher temperatures and form deposits in injectors.

Some combustion particles accumulate in piston ring grooves or get into the crankcase oil. These particles consist of graphitic plates which increase lube oil viscosity and shorten filter life. Since the size of particles formed depends more on molecular structure than on combustion conditions, the electron microscope aids in predicting and avoiding difficulties with certain fuels.

The company also uses the instrument for determining the effect of fuel oil additives on storage stability. Suppliers are then required to increase or decrease the amount of such ingredients. The RR has also been engaged in electron microscope studies on dispersancy of lube oils and breakdown of greases.

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TYPE "PC" EXCHANGER

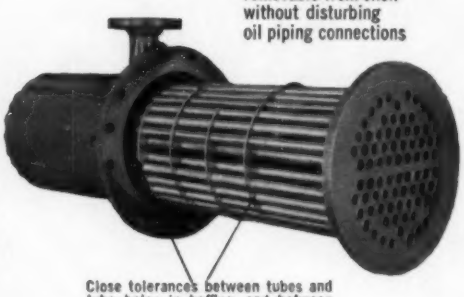
Straight-tube exchanger for oil, water, air or gas

Leak detection holes in retainer ring show leakage from either tube or shell sides (See detail below).

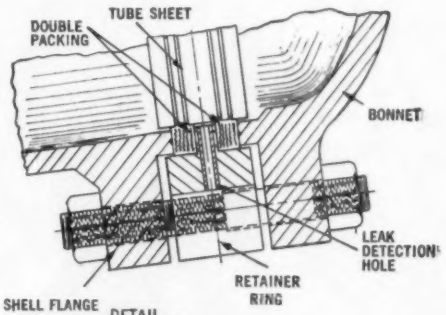
Exclusive "retainer ring" design, available only in Paracoil "PC" Exchangers, permits shell side pressure test with bonnet removed. No auxiliary equipment or special devices are required to hold tube sheet packing against pressure. By backing off only one set of nuts, bonnet may be removed without displacing packing or retainer ring. Pressure may be applied to shell side to test for defective tubes or leaking tube joints. With bonnet off, retention studs hold retainer ring and packing in place.

Tubes may be tested, re-rolled, even replaced, without removing tube bundle from shell.

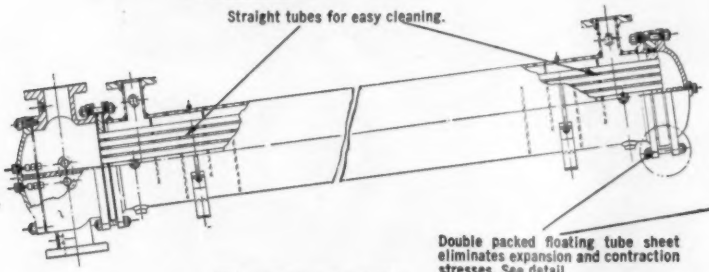
Tube bundle easily removable from shell without disturbing oil piping connections



Close tolerances between tubes and tube holes in baffles, and between baffle periphery and shell, assure maximum heat transfer.



DETAIL — Section thru floating tube sheet showing packing and detection hole in retainer ring.



Double packed floating tube sheet eliminates expansion and contraction stresses. See detail.

Wide selection of materials as dictated by service requirements.

Standard commercial, ASME or Marine Code construction.

HOW IT WORKS

Mixing of shell and tube side fluids due to packing failure is impossible in this Paracoil Type "PC" design. Any leakage from either side, resulting from loosening of bolts or worn packing, escapes through the detection holes. The operating personnel is thus on notice that servicing is required.

Paracoil
HEAT TRANSFER EQUIPMENT

Write for descriptive Bulletin 140

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3073 S. Chase Ave.
Milwaukee 1, Wisconsin

ORENDA INDUSTRIAL, INC.
34-14 58th St.
Woodside 77, N. Y.

WAUKESHA MOTOR COMPANY
West St. Paul Avenue
Waukesha, Wisconsin

WHITE DIESEL ENGINE DIVISION
THE WHITE MOTOR COMPANY
1401 Sheridan Avenue
Springfield, Ohio

Horsepower, over 1000

ALCO PRODUCTS, INC.
30 Church St.
New York 8, N. Y.

AMERICAN M-A-N CORP.
149 Broadway
New York 6, N. Y.

BALDWIN-LIMA-HAMILTON
545 Third Street
Hamilton, Ohio

CHICAGO PNEUMATIC TOOL CO.
6 E. 44th St.
New York, 17, N. Y.

THE COOPER-BESSEMER CORP.
Mt. Vernon, Ohio

DIESEL ENERGY CORP.
82 Beaver Street
New York 5, N. Y.

ENTERPRISE ENGINE & MACHINERY CO.
18th & Florida Streets
San Francisco 10, California

NORDBERG MFG. CO.
3073 S. Chase Ave.
Milwaukee 1, Wisconsin

ORENDA INDUSTRIAL, INC.
34-14 58th St.
Woodside 77, N. Y.

WHITE DIESEL ENGINE DIVISION
THE WHITE MOTOR COMPANY
1401 Sheridan Avenue
Springfield, Ohio

MEDIUM HIGH SPEED 700 to 1200 r.p.m.

Horsepower, 1 to 50

CONTINENTAL MOTORS CORP.
205 Market Street
Muskegon, Michigan

DIESEL ENERGY CORP.
82 Beaver Street
New York 5, N. Y.

LISTER-BLACKSTONE, INC.
42-32 21st Street
Long Island City 1, New York

ORENDA INDUSTRIAL, INC.
34-14 58th St.
Woodside 77, N. Y.

Horsepower, 51 to 100

ALLIS CHALMERS MFG. CO.
MATERIALS HANDLING DIVISION
1135 S. 70th St.
Milwaukee 1, Wisc.

AMERICAN M-A-N CORP.
149 Broadway
New York 6, N. Y.

CONTINENTAL MOTORS CORP.
205 Market Street
Muskegon, Michigan

DIESEL ENERGY CORP.
82 Beaver Street
New York 5, N. Y.

LISTER-BLACKSTONE INC.
42-32 21st Street
Long Island City 1, New York

ORENDA INDUSTRIAL, INC.
34-14 58th St.
Woodside 77, N. Y.

Horsepower, 101 to 500

ALLIS CHALMERS MFG. CO.
MATERIALS HANDLING DIVISION
1135 S. 70th St.
Milwaukee 1, Wisc.

AMERICAN M-A-N CORP.
149 Broadway
New York 6, N. Y.

CHICAGO PNEUMATIC TOOL CO.
6 East 44th Street
N. Y., N. Y.

CONTINENTAL MOTORS CORP.
205 Market Street
Muskegon, Michigan

THE COOPER-BESSEMER CORP.
Mt. Vernon, Ohio

DIESEL ENERGY CORP.
82 Beaver Street
New York 5, N. Y.

INGERSOLL-RAND CO.
11 Broadway
New York, N. Y.

ORENDA INDUSTRIAL, INC.
34-14 58th St.
Woodside 77, N. Y.

STERLING ENGINE COMPANY, INC.
Menomines,
Michigan

WAUKESHA MOTOR CO.
West St. Paul Avenue
Waukesha, Wisconsin

WHITE DIESEL ENGINE DIVISION
THE WHITE MOTOR COMPANY
1401 Sheridan Avenue
Springfield, Ohio

Horsepower, 501 to 1000

ALCO PRODUCTS, INC.
30 Church St.
New York 8, N. Y.

AMERICAN M-A-N CORP.
149 Broadway
New York 6, N. Y.

CHICAGO PNEUMATIC TOOL CO.
6 East 44th Street
N. Y., N. Y.

COOPER-BESSEMER CORP.
Mount Vernon, Ohio

DIESEL ENERGY CORP.
82 Beaver St.
New York, 5, N. Y.

INGERSOLL-RAND CO
11 Broadway
New York 4, N. Y.

NORDBERG MFG. CO.
3073 S. Chase Avenue
Milwaukee 1, Wisconsin

STERLING ENGINE COMPANY, INC.
Menominee,
Michigan

WAUKESHA MOTOR CO.
West St. Paul Avenue
Waukesha, Wisconsin

WHITE DIESEL ENGINE DIVISION
THE WHITE MOTOR COMPANY
1401 Sheridan Avenue
Springfield, Ohio

Horsepower, over 1000

ALCO PRODUCTS INC.
30 Church St., N. Y. 8, N. Y.

AMERICAN M-A-N CORP.
149 Broadway
New York 6, N. Y.

CHICAGO PNEUMATIC TOOL CO.
6 East 44th Street
New York 17, New York

THE COOPER-BESSEMER CORP.
Mt. Vernon, Ohio

WAUKESHA MOTOR COMPANY
West St. Paul Avenue
Waukesha, Wisconsin

HIGH SPEED, over 1200 r.p.m.

Horsepower, 1 to 50

ALLIS CHALMERS MFG. CO.
MATERIALS HANDLING DIVISION
1135 S. 70th St.
Milwaukee 1, Wisc.

AMERICAN M-A-N CORP.
149 Broadway
New York 6, N. Y.

AMERICAN MARC INC.
1601 West Florence Ave.
Inglewood, California

BURMEISTER & WAIN AMERICAN CORP.
Mystic, Connecticut

CONTINENTAL MOTORS CORP.
205 Market Street
Muskegon, Michigan

CURTISS-WRIGHT CORP.
UTICA DIVISION
50500 Mound Rd.
Utica, Michigan

DAIMLER-BENZ—A.G.
Stuttgart, Germany

DIESEL ENERGY CORP.
82 Beaver Street
New York 5, N. Y.

FAIRBANKS, MORSE & CO.
INDUSTRIAL DIVISION
600 So. Michigan Ave.
Chicago, Illinois

HERCULES MOTORS CORP.
101 Eleventh St. S.E.
Canton 2, Ohio

LISTER-BLACKSTONE, INC.
42-32 21st Street
Long Island City 1, New York

NORDBERG MFG. CO
3073 South Chase Avenue
Milwaukee 1, Wisconsin

D. W. ONAN & SONS, INC.
2515-University Ave., S. E.
Minneapolis 14, Minnesota

ORENDA INDUSTRIAL, INC.
34-14 58th St.
Woodside 77, N. Y.

F. PERKINS (CANADA) LTD.
60 Wingold Avenue
Toronto 19, Ontario, Canada

R. H. SHEPPARD CO., INC.
Hanover, Pa.

WAUKESHA MOTOR CO.
West St. Paul Avenue
Waukesha, Wisconsin

Horsepower, 51 to 100

ALLIS CHALMERS MFG. CO.
MATERIALS HANDLING DIVISION
1135 S. 70th St.
Milwaukee 1, Wisc.

AMERICAN M-A-N CORP.
149 Broadway
New York 6, N. Y.

BURMEISTER & WAIN AMERICAN CORP.
Mystic, Connecticut

CONTINENTAL MOTORS CORP.
205 Market Street
Muskegon, Michigan

CURTISS-WRIGHT CORP.
UTICA DIVISION
50500 Mound Rd.
Utica, Michigan

DAIMLER-BENZ—A.G.
Stuttgart, Germany

DIESEL ENERGY CORP.
82 Beaver Street
New York 5, N. Y.

FAIRBANKS, MORSE & CO.
INDUSTRIAL DIVISION
600 So. Michigan Avenue
Chicago, Illinois

FORD MOTOR COMPANY
INDUSTRIAL ENGINE DEPT.
Southfield Road at Rotunda Drive
P. O. Box 598
Dearborn, Michigan

HERCULES MOTORS CORP.
101-11th Street S.E.
Canton 2, Ohio

ORENDA INDUSTRIAL, INC.
34-14 58th St.
Woodside 77, N. Y.

F. PERKINS (CANADA) LTD.
60 Wingold Avenue
Toronto 19, Ontario, Canada

R. H. SHEPPARD CO. INC.
Hanover, Pa.

WAUKESHA MOTOR CO.
St. Paul Avenue
Waukesha, Wisconsin

Horsepower, 101 to 500

ALLIS CHALMERS MFG. CO.
MATERIALS HANDLING DIVISION
1135 S. 70th St.
Milwaukee 1, Wisc.

AMERICAN M-A-N CORP.
149 Broadway
New York 6, N. Y.

CONTINENTAL MOTORS CORP.
205 Market Street
Muskegon, Michigan

CURTISS-WRIGHT CORP.
UTICA DIVISION
50500 Mound Rd.
Utica, Michigan

DAIMLER-BENZ—A.G.
Stuttgart, Germany

DIESEL ENERGY CORP.
82 Beaver Street
New York 5, N. Y.

HERCULES MOTORS CORP.
101-11th S.E.
Canton 2, Ohio

F. PERKINS (CANADA) LTD.
60 Wingold Avenue
Toronto 19, Ontario, Canada

WAUKESHA MOTOR CO.
West St. Paul Avenue
Waukesha, Wisconsin

Horsepower, 501 to 1000

AMERICAN M-A-N CORPORATION
149 Broadway
New York 6, New York

CURTISS-WRIGHT CORP.
UTICA DIVISION
50500 Mound Rd.
Utica, Michigan

DAIMLER-BENZ—A.G.
Stuttgart, Germany

Horsepower, Over 1000

AMERICAN M-A-N CORPORATION
149 Broadway
New York 6, New York

CURTISS-WRIGHT CORP.
UTICA DIVISION
50500 Mound Rd.
Utica, Michigan

DAIMLER-BENZ—A.G.
Stuttgart, Germany

INTERNATIONAL HARVESTER CO.
180 N. Michigan Ave.
Chicago 1, Illinois

. . . SUPPLIES, ACCESSORIES & EQUIPMENT

Abrasives, Honing

MICROMATIC HONE CORP.
8100 Schoolcraft Ave.
Detroit 38, Michigan

Adapters, Engine Indicator

BACHARACH INDUSTRIAL INSTRUMENT CO.
200 N. Braddock Ave.
Pittsburgh 8, Pennsylvania

KIENE DIESEL ACCESSORIES, INC.
10352 Pacific Ave.
Franklin Park, Ill.

Adapters, Tachometer

BARBOUR STOCKWELL CO.
205 Broadway
Cambridge 39, Mass.

Additives for Diesel Fuel Oil

See also "Diesel Fuel Oil Tar and Carbon Dispersing Agent," "Fuel Oil Additives," "Fuel Oil Treatment, Diesel"

E. I. DU PONT DE NEMOURS & CO., INC.
Petroleum Chemical Division
Wilmington 98, Del.

LUBAID COMPANY
3270 S. Third St.
Milwaukee 7, Wisconsin

R. S. NORRIS & ASSOCIATES
26 Valley Rd.
Larchmont, N. Y.

RHODIA, INC.
60 East 56th St.
New York 22, N. Y.

Adjusting Screws

CHICAGO SCREW COMPANY
DIV. STANDARD SCREW CO.
2701 Washington Blvd.
Bellwood, Illinois

Aftercoolers, Air Compressor

See also "Aftercoolers, Supercharger," "Coolers, Compressed Air, Gas," "Supercharger Intercoolers"

BROWN BOVERI CORP.
19 Rector St.
New York 6, N. Y.

DAVIS ENGINEERING CORP.
30 Rockefeller Plaza
New York 20, N. Y.

THE ROME-TURNEY RADIATOR CO.
Rome,
New York

THE WHITLOCK MFG. CO.
West Hartford 10,
Connecticut

YOUNG RADIATOR CO.
709 S. Marquette St.
Racine, Wisconsin

Aftercoolers, Supercharger

BROWN BOVERI CORP.
19 Rector St.
New York 6, N. Y.

HARRISON RADIATOR DIVISION
General Motors Corp.
Lockport, N. Y.

PERFEX CORPORATION
500 West Oklahoma Ave.
Milwaukee 7, Wisconsin

YOUNG RADIATOR CO.
709 S. Marquette St.
Racine, Wisconsin

Air Compressors

See also headings under "Compressors"

INGERSOLL-RAND CO.
11 Broadway
New York 4, N. Y.

MIEHLE-DEXTER SUPERCHARGER DIV.
100 Fourth Street
Racine, Wisconsin

QUINCY COMPRESSOR CO.
Quincy, Ill.

THOMPSON PRODUCTS, INC.
JET DIVISION
23555 Euclid Ave.
Cleveland 17, Ohio

Air Filters

See also headings under "Filters" and "Cleaners," "Air Filters Automatic Self-Cleaning"

DONALDSON COMPANY, INC.
666 Pelham Blvd.
St. Paul 14, Minn.

FRAM CORP.
Providence 16, R. I.

PUROLATOR PRODUCTS, INC.
970 New Brunswick Ave.
Rahway, New Jersey

VORTOX COMPANY
121 South Alexander Avenue
Claremont, California

WIX CORPORATION
Gastonia, N. C.

Air Filters, Automatic, Self-Cleaning

DONALDSON COMPANY, INC.
666 Pelham Blvd.
St. Paul 14, Minn.

Air Starting Motor, Diesel Engine

See also "Starting Motors, Air" "Cranking Motors, Air"

INGERSOLL-RAND CO.
11 Broadway
New York 4, N. Y.

Air Tools

INGERSOLL-RAND CO.
11 Broadway
New York 4, N. Y.

Air Velocity Meters

BACHARACH INDUSTRIAL INSTRUMENT CO.
200 N. Braddock Ave.
Pittsburgh 8, Pa.

ILLINOIS TESTING LABORATORIES, INC.
420 N. LaSalle Street
Chicago 10, Ill.

Alarm Systems, Pressure & Temperature

See also headings under "Controls."

ROBERTSHAW-FULTON CONTROLS CO.
FULTON SYLPHON DIVISION
P. O. Box 400
Knoxville 1, Tennessee

KYSOR HEATER CO.
1100 W. Wright St.
Cadillac, Mich.

FRANK W. MURPHY MFG., INC.
Box 4537
Tulsa 1, Oklahoma

SYNCHRO-START PRODUCTS
8151 N. Ridgeway Ave.
Skokie, Ill.

VIKING INSTRUMENTS
Towne Street
East Haddam, Conn.

Alloy Steel Nuts and Bolts

See also headings under "Bolts" & "Nuts."

HARTFORD MACHINE SCREW CO.
Box 1440
Hartford 2, Conn.

Alloys, High Temperature and Corrosion Resistant

INTERNATIONAL NICKEL CO., INC.
67 Wall St.
New York 5, N. Y.

Ammeters

See also "Meters, Electrical Indicating," "Volt-Ammeters, Clamp-on Type," "Ammeters, Tong-Test Type (Clamp-On)"

ROCHESTER MFG. CO., INC.
Rockwood St.
Rochester 10, N. Y.

Ammeters, Tong Test Type (clamp-on)

COLUMBIA ELECTRIC MFG. COMPANY
4537 Hamilton Avenue
Cleveland 14, Ohio

Anti-Rust Compounds

See also "Rust Preventives," "Inhibitors, Water," "Engine Cooling System, Rust Preventives."

YOUNG RADIATOR COMPANY
709 S. Marquette St.
Racine, Wis.

Asbestos, Sheet

See also headings under "Gaskets"

THE DARCOID CO., INC.
145-6th Avenue
New York 13, N. Y.
VICTOR MFG. & GASKET CO.
P. O. Box 1333
Chicago 90, Ill.

Automatic Control Panels

See also headings under "Controls."

VIKING INSTRUMENTS, INC.
Towne Street
East Haddam, Conn.

Automatic Controls, Starting

See also "Controls, Automatic Starting."

CONSOLIDATED DIESEL ELECTRIC CORP.
POWER EQUIPMENT DIVISION
880 Canal Street
Stamford, Conn.
FRANK W. MURPHY MFG., INC.
Box 4537
Tulsa 1, Oklahoma
SYNCHRO-START PRODUCTS, INC.
8151 N. Ridgeway Avenue
Skokie, Illinois

Automotive Greases

See also "Greases," "Lubricants"

THE TEXAS COMPANY
135 E. 42nd Street
New York 17, N. Y.

Automotive Lubricating Oils

See also "Lubricating Oils," "Lubricants," "Diesel Engine Lubricating Oil"

NATIONAL REFINING CO.
P. O. Box 6479
Cleveland 1, Ohio
THE TEXAS COMPANY
135 E. 42nd Street
New York 17, N. Y.

Auxiliary Diesel Generating Sets

See also "Diesel Generating Sets"; headings under "Emergency Diesel . . . ", "Power Plants", "Generator Sets, Electric", "Packaged Generators".

AMERICAN M-A-N CORPORATION
149 Broadway
New York 6, New York
BURMEISTER & WAIN AMERICAN CORP.
Mystic, Conn.
CLEVELAND DIESEL ENGINE DIV.
GENERAL MOTORS CORP.
2160 West 106th St.
Cleveland 11, Ohio
CONSOLIDATED DIESEL ELECTRIC CORP.
POWER EQUIPMENT DIVISION
880 Canal Street
Stamford, Conn.
LISTER-BLACKSTONE, INC.
42-32 21 Street
Long Island City 1, N. Y.
MASCHINENBAU KIEL A.G. MAK
Kiel-Friedrichsort
Kiel, West Germany
P & H DIESEL ENGINE DIV.
HARNISCHFEGER CORP.
500 S. Main St.
Crystal Lake, Ill.
NATIONAL METAL & STEEL CORP.
1251 New Dock St.
Terminal Island, Calif.
STERLING ENGINE CO., INC.
Menominee, Mich.
WAUKESHA MOTOR COMPANY
West St. Paul Avenue
Waukesha, Wis.

Axles

CLARK EQUIPMENT CO.
Buchanan-Jackson, Mich.

Balancing Machines

TAYLOR DYNAMOMETER & MACHINE CO.
6411 River Parkway
Milwaukee 13, Wis.

Bars, Bronze

See also headings under "Bronze"

BUNTING BRASS & BRONZE COMPANY
715 Spencer
Toledo 1, Ohio
JOHNSON BRONZE CO.
470 S. Mill St.
New Castle, Pa.

Batteries, Nickel Cadmium, Storage

See also "Batteries, Storage", "Starting Batteries, Storage"

NICAD DIVISION
GOULD NATIONAL BATTERIES, INC.
176 Pleasant St.
Easthampton 6, Mass.
NIFE, INC.
Lambert Ave.
Copiague, N. Y.

Batteries, Storage

See above.

DELCO-REMY DIVISION
GENERAL MOTORS CORP.
2401 Columbus Avenue
Anderson, Indiana
EXIDE INDUSTRIAL DIV.
THE ELECTRIC STORAGE BATTERY CO.
42 S. 15th St.
Philadelphia 2, Pa.
NICAD DIVISION
GOULD NATIONAL BATTERIES, INC.
176 Pleasant St.
Easthampton 6, Mass.
NIFE INC.
Lambert Ave.
Copiague, N. Y.

Battery Chargers

EXIDE INDUSTRIAL DIV.
ELECTRIC STORAGE BATTERY CO.
42 S. 15 St.
Philadelphia 2, Pa.

Battery Charging Regulator

THE ELECTRIC AUTO-LITE CO.
Champlain St.
Toledo 1, Ohio

Bearing Pullers

See also "Pullers, Gear, Bushing, Wheel".

KENT-MOORE ORGANIZATION, INC.
28635 Mound Road
Warren, Mich.

Bearings

AMERICAN BEARING CORP.
429 So. Harding St.
Indianapolis 7, Ind.
BUNTING BRASS & BRONZE COMPANY
715 Spencer
Toledo 1, Ohio
CLEVELAND GRAPHITE BRONZE CO.
(DIV. OF CLEVITE CORP.)
17000 St. Clair Ave.
Cleveland 10, Ohio
FEDERAL-MOGUL DIV.
FEDERAL-MOGUL-BOWER BEARINGS, INC.
11031 Shoemaker Ave.
Detroit 13, Mich.
HOOVER BALL & BEARING CO.
P. O. Box 607
Ann Arbor, Mich.

Bearings, Aluminum

ALUMINUM CO. OF AMERICA
1501 Alcoa Bldg.
Pittsburgh 19, Pa.
AMERICAN BEARING CORP.
429 So. Harding St.
Indianapolis 7, Ind.
CLEVELAND GRAPHITE BRONZE CO.
(DIV. OF CLEVITE CORP.)
17000 St. Clair Ave.
Cleveland 10, Ohio
DETROIT ALUMINUM & BRASS CORP.
3975 Christopher Ave.
Detroit 11, Michigan
JOHNSON BRONZE COMPANY
470 South Mill Street
New Castle, Pennsylvania
PIONEER MOTOR BEARING CO.
116 Beacon St.
South San Francisco, Calif.

Bearings, Aluminum Lined

FEDERAL-MOGUL DIV.
FEDERAL-MOGUL-BOWER BEARINGS, INC.
11031 Shoemaker Avenue
Detroit 13, Michigan

Bearings, Babbitted

AMERICAN BEARING CORP.
429 So. Harding St.
Indianapolis 7, Ind.
BUNTING BRASS & BRONZE COMPANY
715 Spencer
Toledo 1, Ohio
CLEVELAND GRAPHITE BRONZE CO.
(DIVISION OF CLEVITE CORP.)
17000 St. Clair Ave.
Cleveland 10, Ohio
DETROIT ALUMINUM & BRASS CORP.
3975 Christopher Ave.
Detroit 11, Michigan
FEDERAL-MOGUL DIV.
FEDERAL-MOGUL-BOWER BEARINGS, INC.
11031 Shoemaker Ave.
Detroit 13, Mich.
JOHNSON BRONZE CO.
470 S. Mill St.
New Castle, Pa.
PIONEER MOTOR BEARING CO.
116 Beacon St.
South San Francisco, Calif.

Bearings, Babbitted and Bronze Bushed

AMERICAN BEARING CORP.
429 So. Harding St.
Indianapolis 7, Ind.
BUNTING BRASS & BRONZE CO.
715 Spencer St.
Toledo 1, Ohio
CLEVELAND GRAPHITE BRONZE CO.
DIV. OF CLEVITE CORP.
17000 St. Clair Ave.
Cleveland 10, Ohio
DETROIT ALUMINUM & BRASS CORP.
3975 Christopher Ave.
Detroit 11, Michigan
FEDERAL-MOGUL DIV.
FEDERAL-MOGUL-BOWER BEARINGS, INC.
11031 Shoemaker Ave.
Detroit 13, Mich.
JOHNSON BRONZE CO.
470 S. Mill St.
New Castle, Pa.

Bearings, Ball
HOOVER BALL & BEARING CO.
P. O. Box 607
Ann Arbor, Mich.

Bearings, Bronze
See also "Bronze Bearings"
AMERICAN BEARING CORP.
429 So. Harding St.
Indianapolis 7, Ind.
BUNTING BRASS & BRONZE COMPANY
715 Spencer
Toledo 1, Ohio
CLEVELAND GRAPHITE BRONZE CO.
(DIV. OF CLEVITE CORP.)
17000 St. Clair Ave.
Cleveland 10, Ohio
JOHNSON BRONZE CO.
470 S. Mill St.
New Castle, Pa.
PIONEER MOTOR BEARING CO.
116 Beacon St.
South San Francisco, Calif.

Bearings, Bronze and Steel Backed, Babbitt-Lined
AMERICAN BEARING CORP.
429 So. Harding St.
Indianapolis 7, Ind.
BUNTING BRASS & BRONZE CO.
715 Spencer
Toledo 1, Ohio
CLEVELAND GRAPHITE BRONZE CO.
(DIVISION OF CLEVITE CORP.)
17000 St. Clair Ave.
Cleveland, Ohio
DETROIT ALUMINUM & BRASS CORP.
3975 Christopher Ave.
Detroit 11, Michigan
FEDERAL-MOGUL DIV.
FEDERAL-MOGUL-BOWER BEARINGS, INC.
11031 Shoemaker Ave.
Detroit 13, Mich.
JOHNSON BRONZE COMPANY
470 South Mill Street
New Castle, Pennsylvania
PIONEER MOTOR BEARING CO.
116 Beacon St.
South San Francisco, Calif.

Bearings, Centrifugally Rebabbitted
PIONEER MOTOR BEARING CO.
116 Beacon St.
So. San Francisco, Calif.

Bearings, Copper-Lead
AMERICAN BEARING CORP.
429 So. Harding St.
Indianapolis 7, Ind.
CLEVELAND GRAPHITE BRONZE CO.
(DIV. OF CLEVITE CORP.)
17000 St. Clair Ave.
Cleveland 10, Ohio
DETROIT ALUMINUM & BRASS CORP.
3975 Christopher Ave.
Detroit 11, Mich.
FEDERAL-MOGUL DIV.
FEDERAL-MOGUL-BOWER BEARINGS, INC.
11031 Shoemaker Ave.
Detroit 13, Mich.
JOHNSON BRONZE CO.
470 S. Mill St.
New Castle, Pa.

Bearings, Lead-Bronze
AMERICAN BEARING CORP.
429 So. Harding St.
Indianapolis 7, Ind.
BUNTING BRASS & BRONZE COMPANY
715 Spencer
Toledo 1, Ohio
CLEVELAND GRAPHITE BRONZE CO.
(DIV. OF CLEVITE CORP.)
17000 St. Clair Ave.
Cleveland 10, Ohio
DETROIT ALUMINUM & BRASS CORP.
3975 Christopher Ave.
Detroit 11, Mich.
JOHNSON BRONZE CO.
470 S. Mill St.
New Castle, Pa.

Bearings, Piston Pin
AMERICAN BEARING CORP.
429 So. Harding St.
Indianapolis 7, Ind.
BUNTING BRASS & BRONZE COMPANY
715 Spencer
Toledo 1, Ohio
CLEVELAND GRAPHITE BRONZE CO.
(DIV. OF CLEVITE CORP.)
17000 St. Clair Ave.
Cleveland 10, Ohio
JOHNSON BRONZE CO.
470 S. Mill St.
New Castle, Pa.

Bearings, Self-Lubricating
BUNTING BRASS & BRONZE COMPANY
715 Spencer
Toledo 1, Ohio
CLEVELAND GRAPHITE BRONZE CO.
(DIV. OF CLEVITE CORP.)
17000 St. Clair Ave.
Cleveland 10, Ohio
HOOVER BALL & BEARING CO.
P. O. Box 607
Ann Arbor, Mich.
JOHNSON BRONZE COMPANY
470 South Mill Street
New Castle, Pennsylvania

Bearings, Sleeve, Copper-Lead Lined
AMERICAN BEARING CORP.
429 So. Harding St.
Indianapolis 7, Ind.
CLEVELAND GRAPHITE BRONZE CO.
(DIVISION OF CLEVITE CORP.)
17000 St. Clair Ave.
Cleveland, Ohio
DETROIT ALUMINUM & BRASS CORP.
3975 Christopher Ave.
Detroit 11, Michigan
JOHNSON BRONZE CO.
470 S. Mill St.
New Castle, Pa.

Bearings, Special Alloys
AMERICAN BEARING CORP.
429 So. Harding St.
Indianapolis 7, Ind.
BUNTING BRASS & BRONZE COMPANY
715 Spencer
Toledo 1, Ohio
CLEVELAND GRAPHITE BRONZE CO.
(DIVISION OF CLEVITE CORP.)
17000 St. Clair Ave.
Cleveland, Ohio
JOHNSON BRONZE CO.
470 S. Mill St.
New Castle, Pa.

Bearings, Steel-Backed, Copper-Lead Lined
AMERICAN BEARING CORP.
429 So. Harding St.
Indianapolis 7, Ind.
CLEVELAND GRAPHITE BRONZE CO.
(DIVISION OF CLEVITE CORP.)
17000 St. Clair Avenue
Cleveland 10, Ohio
DETROIT ALUMINUM & BRASS CORP.
3975 Christopher Ave.
Detroit 11, Michigan
FEDERAL-MOGUL DIV.
FEDERAL-MOGUL-BOWER BEARINGS, INC.
11031 Shoemaker Ave.
Detroit 13, Mich.
JOHNSON BRONZE CO.
470 South Mill St.
New Castle, Pa.

Bearings, Wrist Pin
BUNTING BRASS & BRONZE COMPANY
715 Spencer
Toledo 1, Ohio

Bellows, Stainless Steel
FLEXONICS CORP.
1363 S. 3rd Ave.
Maywood, Ill.

Belting, Chain
See also headings under "Chain".
DIAMOND CHAIN COMPANY, INC.
402 Kentucky Ave.
Indianapolis, Indiana

Blowers, Centrifugal
See also "Supercharging Blowers"
AMERICAN AIR FILTER CO., INC.
215 Central Ave.
Louisville 8, Ky.
BROWN BOVERI CORP.
19 Rector St.
New York 6. N. Y.
ELLIOTT COMPANY
Jeannette, Pennsylvania
ENGINEERING CO., LTD.
Dr. Alfred J. Buchi
Winterthur, Switzerland

Blowers, Rotary, Positive
See above
MIEHLE-DEXTER SUPERCHARGER DIV.
100 Fourth
Racine, Wisconsin

Blowers, Scavenging and Supercharging
See "Supercharging Blowers", "Turbochargers".
BROWN BOVERI CORP.
19 Rector St.
New York 6, N. Y.
ELLIOTT COMPANY
Jeannette, Pennsylvania
ENGINEERING CO., LTD.
Dr. Alfred J. Buchi
Winterthur, Switzerland
MIEHLE-DEXTER SUPERCHARGER DIV.
100 Fourth
Racine, Wisconsin
THOMPSON PRODUCTS, INC.
JET DIV.
23555 Euclid Ave.
Cleveland 17, Ohio

Boilers, Exhaust Gas, Waste Heat
See also "Waste Heat Boilers"
DAVIS ENGINEERING CORP.
30 Rockefeller Plaza
New York 20, N. Y.
THE SIMS COMPANY, INC.
P. O. Box 1096
Erie, Pa.

Bolts
See listing below and "Alloy Steel Bolts & Nuts".
HARTFORD MACHINE SCREW CO.
Box 1440
Hartford 2, Connecticut

Bolts, High Tensile
THE CHICAGO SCREW CO.
DIV. STANDARD SCREW CO.
2701 Washington Blvd.
Bellwood, Ill.
HARTFORD MACHINE SCREW CO.
Box 1440
Hartford 2, Connecticut

Brazing Copper, Atmospheric
BURGESS-NORTON MFG. CO.
737 Peyton St.
Geneva, Ill.

Bronze Bar Stock, Completely Finished
See also "Bars, Bronze".
BUNTING BRASS & BRONZE COMPANY
715 Spencer
Toledo 1, Ohio

JOHNSON BRONZE CO.
470 S. Mill St.
New Castle, Pa.

Bronze Bearings

See also "Bearings, Bronze"

BUNTING BRASS & BRONZE COMPANY
715 Spencer
Toledo 1, Ohio
CLEVELAND GRAPHITE BRONZE CO.
(DIV. OF CLEVITE CORP.)
17000 St. Clair Ave.
Cleveland 10, Ohio
JOHNSON BRONZE CO.
470 S. Mill St.
New Castle, Pa.

Bronze Washers

BUNTING BRASS & BRONZE COMPANY
715 Spencer
Toledo 1, Ohio
CLEVELAND GRAPHITE BRONZE CO.
(DIVISION OF CLEVITE CORP.)
17000 St. Clair Avenue
Cleveland 10, Ohio
FEDERAL-MOGUL DIV.
FEDERAL-MOGUL-BOWER BEARINGS, INC.
11031 Shoemaker Ave.
Detroit 13, Mich.
JOHNSON BRONZE CO.
470 S. Mill St.
New Castle, Pa.

Brushes, Carbon

KENT-MOORE ORGANIZATION, INC.
28635 Mound Road
Warren, Mich.

Bushings, Bronze

AMERICAN BEARING CORP.
429 S. Harding St.
Indianapolis 7, Ind.
BUNTING BRASS & BRONZE COMPANY
715 Spencer
Toledo 1, Ohio
CLEVELAND GRAPHITE BRONZE CO.
(DIVISION OF CLEVITE CORP.)
17000 St. Clair Avenue
Cleveland 10, Ohio
JOHNSON BRONZE CO.
470 S. Mill St.
New Castle, Pa.

Bushings, Bronze (split, rolled)

FEDERAL-MOGUL DIV.
FEDERAL-MOGUL-BOWER BEARINGS, INC.
11031 Shoemaker Ave.
Detroit 13, Mich.

Bushings, High-Lead Bronze

AMERICAN BEARING CORP.
429 S. Harding St.
Indianapolis 7, Ind.
THE BUNTING BRASS & BRONZE CO.
715 Spencer
Toledo 1, Ohio
CLEVELAND GRAPHITE BRONZE CO.
DIV. OF CLEVITE CORP.
17000 St. Clair Ave.
Cleveland 10, Ohio
JOHNSON BRONZE CO.
470 S. Mill St.
New Castle, Pa.

Bushings High-Lead Bronze (Split)

FEDERAL-MOGUL DIV.
FEDERAL-MOGUL-BOWER BEARINGS, INC.
11031 Shoemaker Ave.
Detroit 13, Mich.

Bushings, Lead-Bronze Lined

AMERICAN BEARING CORP.
429 S. Harding St.
Indianapolis 7, Ind.
CLEVELAND GRAPHITE BRONZE CO.
DIV. OF CLEVITE CORP.
17000 St. Clair Ave.
Cleveland 10, Ohio
JOHNSON BRONZE CO.
470 S. Mill St.
New Castle, Pa.

Bushing, Lead-Bronze Lined (Split)

FEDERAL-MOGUL DIV.
FEDERAL-MOGUL-BOWER BEARINGS, INC.
11031 Shoemaker Ave.
Detroit 13, Mich.

Bushings, Steel-Backed, Babbitt-Lined

AMERICAN BEARING CORP.
429 S. Harding St.
Indianapolis 7, Ind.
CLEVELAND GRAPHITE BRONZE CO.
(DIVISION OF CLEVITE CORP.)
17000 St. Clair Avenue
Cleveland 10, Ohio
JOHNSON BRONZE CO.
470 S. Mill St.
New Castle, Pa.
PIONEER MOTOR BEARING CO.
116 Beacon St.
South San Francisco, Calif.

Bushings, Steel-Backed, Babbitt Lined (Split)

FEDERAL-MOGUL DIV.
FEDERAL-MOGUL-BOWER BEARINGS, INC.
11031 Shoemaker Ave.
Detroit 13, Mich.

Bushings, Steel-Backed, Aluminum Lined

CLEVELAND GRAPHITE BRONZE CO.
DIV. OF CLEVITE CORP.
17000 St. Clair Ave.
Cleveland 10, Ohio
FEDERAL-MOGUL DIVISION
FEDERAL-MOGUL-BOWER BEARINGS, INC.
11031 Shoemaker Avenue
Detroit 13, Mich.
JOHNSON BRONZE CO.
470 S. Mill St.
New Castle, Pa.

Camshaft Drives, Roller-Chain

See also headings under "Chain", "Drives, Chain".

DIAMOND CHAIN COMPANY, INC.
402 Kentucky Ave.
Indianapolis, Indiana

Camshaft Forgings

See also "Forgings, drop", "Forgings, Iron & Steel".

THE PARK DROP FORGE CO.
777 East 79 St.
Cleveland 3, Ohio

Camshaft Grinders

See also "Grinders".

VAN NORMAN AUTOMOTIVE EQUIPMENT CO.
3640 Main Street
Springfield 7, Mass.

Camshaft Reconditioning

CLEVELAND HONE & MFG. CO.
8816 Harkness Road
Cleveland 6, Ohio
MORCO INC.
22201 Aurora Ave.
Bedford, Ohio

Carbon Solvents

See also headings under "Solvents", "Cleaning Compounds".

BRULIN & CO., INC.
2939-45 Columbia Ave.
Indianapolis 7, Ind.

Castings, Alloy Iron

GILLETT & EATON, INC.
846 Doughty St.
Lake City, Minn.
THE INTERNATIONAL NICKEL CO., INC.
67 Wall St.
New York 5, N. Y.

Castings, Aluminum

ALUMINUM CO. OF AMERICA
1501 Alcoa Bldg.
Pittsburgh 19, Pa.
GILLETT & EATON, INC.
846 Doughty St.
Lake City, Minnesota
UNITED ENGINE & MACHINE CO.
310 Preda St.
San Leandro, Calif.

Castings, Bi-Metallic

UNITED ENGINE & MACHINE CO.
310 Preda St.
San Leandro, Calif.

Castings, Centrifugal

THE INTERNATIONAL NICKEL CO., INC.
67 Wall St.
New York 5, N. Y.
PERFECT CIRCLE CORP.
552 So. Washington
Hagerstown, Ind.

Castings, Die

ALUMINUM CO. OF AMERICA
1501 Alcoa Bldg.
Pittsburgh 19, Pa.

Castings, Gray Iron

BALDWIN-LIMA-HAMILTON CORP.
545 N. 3rd St.
Hamilton, Ohio
COOPER-BESSEMER CORP.
Mount Vernon, Ohio
ENTERPRISE ENGINE & MACHINERY CO.
18th & Florida Sts.
San Francisco 10, Calif.
WHITE DIESEL ENGINE DIV.
THE WHITE MOTOR CO.
1401 Sheridan Ave.
Springfield, Ohio

Castings Repaired

METALOCK REPAIR SERVICE, INC.
36-15 48 Ave.
Long Island City 1, N. Y.
METALOCK REPAIR SERVICE, INC.
7117 Navigation Blvd.
Houston, Texas
METALOCK REPAIR SERVICE, INC.
1200 E. 16th St.,
Los Angeles, Calif.

Castings, Special Alloy

INTERNATIONAL NICKEL CO., INC.
67 Wall St.
New York 5, N. Y.
D. NAPIER & SON, LTD.
The Vale, Acton
London, W. 3, England
UNITED ENGINE & MACHINE CO.
310 Preda St.
San Leandro, Calif.

Castings, Steel

ENTERPRISE ENGINE & MACHINERY CO.
18th & Florida Sts.
San Francisco 10, Calif.
ERIE FORGE & STEEL CORP.
1341 W. 16 St.
Erie, Pa.
D. NAPIER & SON, LTD.
The Vale, Acton
London, W. 3, England

Centrifugal Blowers and Pumps

ENGINEERING CO., LTD.
Dr. Alfred J. Buchi
Winterthur, Switzerland

Centrifugal Purifiers, Lube & Fuel Oil

See next heading and those under "Purifiers", "Clarifiers, Oil", "Filters (Centrifugal) Lubricating Oil", "Separaters", "Conditioners, Fuel & Lube Oil".

CENTRICO, INC.
75 W. Forest Ave.
Englewood, N. J.

THE DE LAVAL SEPARATOR CO.
The De Laval Building
Poughkeepsie, N. Y.
THE SHARPLES CORP.
2300 Westmoreland St.
Philadelphia 40, Pa.

Centrifuges, Oil Purifying

See heading above.
THE SHARPLES CORP.
2300 Westmoreland St.
Philadelphia 40, Pa.

Chain Drives, Complete

See headings below and "Camshaft Drives, Roller Chain", "Drives, Chain"
DIAMOND CHAIN CO., INC.
402 Kentucky Avenue
Indianapolis 7, Indiana

Chains, Control

DIAMOND CHAIN CO., INC.
402 Kentucky Avenue
Indianapolis 7, Indiana

Chains, Dual Engine Drive

DIAMOND CHAIN CO., INC.
402 Kentucky Avenue
Indianapolis 7, Indiana

Chains, Power Transmission

DIAMOND CHAIN COMPANY, INC.
402 Kentucky Avenue
Indianapolis 7, Indiana

Chains, Roller

DIAMOND CHAIN COMPANY, INC.
402 Kentucky Avenue
Indianapolis 7, Indiana

Chains, Timing

See also "Timing Chains"
DIAMOND CHAIN COMPANY, INC.
402 Kentucky Avenue
Indianapolis 7, Indiana

Chromium Plating

See also "Plating, Chromium", "Crankshafts, Chromium Plated".
CHROMIUM CORP. OF AMERICA
100 Park Ave.
New York 17, N. Y.
METAL FINISHERS, INC.
1725 E. 27th St.
Cleveland 14, Ohio
SPAR-TAN ENGINEERING CO.
496 Bauchet St.
Los Angeles 12, Calif.
VAN DER HORST CORP. OF AMERICA
1313 E. State St.
Olean, N. Y.
VAN DER HORST CORP. OF AMERICA
Grove & Delph St.,
Terrell, Texas
VAN DER HORST CORP. OF AMERICA
2610 S. Shields Ave.,
Chicago, Ill.

Chromium Plating, Crankshafts

CLEVELAND HONE & MFG. CO.
8816 Harkness Road
Cleveland 6, Ohio
LANE PLATING WORKS
5322 Bonnie View Road
P. O. Box 9115
Dallas 15, Texas
NATIONAL FORGE & ORDNANCE CO.
Irvine,
Warren City, Pa.
PENNINGTON CHANNELCROMIUM CO.
319 Dakota St.
San Antonio 3, Texas
VAN DER HORST CORP. OF AMERICA
1313 E. State St.
Olean, N. Y.
VAN DER HORST CORP. OF AMERICA
Grove & Delph St.,
Terrell, Texas
VAN DER HORST CORP. OF AMERICA
2610 S. Shields Ave.,
Chicago, Ill.

Chromium Treated Parts

METAL FINISHERS, INC.
1725 E. 27th St.
Cleveland 14, Ohio

PENNINGTON CHANNELCROMIUM CO.
319 Dakota St.
San Antonio 3, Texas
VAN DER HORST CORP. OF AMERICA
1313 E. State St.
Olean, N. Y.
VAN DER HORST CORP. OF AMERICA
Grove & Delph St.,
Terrell, Texas
VAN DER HORST CORP. OF AMERICA
2610 S. Shields Ave.,
Chicago, Ill.

Clarifiers, Oil

See also headings under "Filters", "Purifiers, Oil", "Centrifugal Purifiers, Lube & Fuel Oil", "Separators", "Conditioners, Fuel & Lube Oil".
CENTRICO, INC.
75 W. Forest Ave.
Englewood, New Jersey
COMMERCIAL FILTER CORP.
2 Main St.
Melrose 76, Mass.
INDIANA COMMERCIAL FILTER CORP.
Lebanon, Indiana
THE DE LAVAL SEPARATOR CO.
25 Columbia Street
Poughkeepsie, N. Y.
WM. W. NUGENT & CO., INC.
3426 Cleveland St.
Skokie, Ill.
THE SHARPLES CORP.
2300 Westmoreland St.
Philadelphia 40, Pa.

Cleaners, Air, Oil Bath Type

See also headings under "Air Filters" and "Filters".
DONALDSON COMPANY, INC.
666 Pelham Blvd.
St. Paul 14, Minn.
VORTOX COMPANY
121 S. Alexander Ave.
Claremont, Calif.

Cleaning Compounds

See also headings under "Solvents", "Detergents"
BRULIN & COMPANY, INC.
2939-45 Columbia Ave.
Indianapolis 7, Ind.
CLAYTON MFG. COMPANY
401 N. Temple City Boulevard
El Monte, California
LIX CORP. OF MISSOURI
300 W. 80th St.
Kansas City, Missouri
MAGNUSON PRODUCTS CORP.
50 Court St.
Brooklyn 1, New York
OAKITE PRODUCTS, INC.
19 Rector Street
New York 6, N. Y.

Clutch Discs

ROCKFORD CLUTCH DIVISION
BORG-WARNER CORP.
1301 18th Avenue
Rockford, Illinois

Clutches

MERCURY CLUTCH DIV.
AUTOMATIC STEEL PRODUCTS, INC.
Canton 6, Ohio
ROCKFORD CLUTCH DIVISION
BORG-WARNER CORP.
1301 18th Ave.
Rockford, Illinois
TWIN DISC CLUTCH COMPANY
1328 Racine St.
Racine, Wisc.

Clutches, Air-Actuated

TWIN DISC CLUTCH COMPANY
Racine, Wisc.

Clutches, Automotive

LONG MFG. DIV.
BORG-WARNER CORP.
12501 Dequindre
Detroit 12, Mich.
ROCKFORD CLUTCH DIV.
BORG WARNER CORP.
1301 18th Ave.
Rockford, Ill.

Clutches, Friction and Jaw

MERCURY CLUTCH DIV.
AUTOMATIC STEEL PRODUCTS, INC.
Canton 6, Ohio
ROCKFORD CLUTCH DIVISION
BORG-WARNER CORP.
1301 18th Avenue
Rockford, Illinois
TWIN DISC CLUTCH CO.
1328 Racine St.
Racine, Wis.

Clutches, Hydraulic

ROCKFORD CLUTCH DIV.
BORG WARNER CORP.
1301 18th Ave.
Rockford, Ill.
TWIN DISC CLUTCH CO.
1328 Racine St.
Racine, Wisc.

Clutches, Miniature Jaw

BARBOUR STOCKWELL CO.
205 Broadway
Cambridge 39, Mass.

Clutches, Power Transmission

MERCURY CLUTCH DIV.
AUTOMATIC STEEL PRODUCTS, INC.
Canton 6, Ohio
LONG MFG. DIV.
BORG-WARNER CORP.
12581 Dequindre
Detroit 12, Mich.
ROCKFORD CLUTCH DIVISION
BORG-WARNER CORP.
1301 18th Avenue
Rockford, Illinois
TWIN DISC CLUTCH CO.
1328 Racine St.
Racine, Wisc.

Cold Weather Starter

START PILOT CORP.
61 Second St.
Mineola, N. Y.

Collector, Pre-cleaner

DONALDSON CO., INC.
666 Pelham Blvd.
St. Paul 14, Minn.

Compression Testers, Diesel Engine

See also headings under "Indicators"
BACHARACH INDUSTRIAL INSTRUMENT CO.
200 N. Braddock Ave.
Pittsburgh 8, Pa.
KENT-MOORE ORGANIZATION, INC.
28635 Mound Rd.
Warren, Mich.
KIENE DIESEL ACCESSORIES, INC.
10352 Pacific Ave.
Franklin Park, Illinois

Compressors, Air

See also "Air Compressors"
BROWN BOVERI CORP.
19 Rector St.
New York 6, New York
THE COOPER-BESSEMER CORP.
Mt. Vernon, Ohio
MIEHLE-DEXTER SUPERCHARGER DIV.
100 Fourth
Racine, Wisc.
QUINCY COMPRESSOR CO.
Dept. DP
Quincy, Illinois

Compressors, Reciprocating, Air and Gas, All Drives
THE COOPER-BESSEMER CORP.
Mt. Vernon, Ohio
INGERSOLL-RAND CO.
11 Broadway
New York 4, N. Y.
THOMPSON PRODUCTS, INC.
JET DIV.
23555 Euclid Ave.
Cleveland 17, Ohio
WORTHINGTON CORP.
Worthington Ave.
Harrison, New Jersey

Condensers, Atmospheric Evaporative Steam & Vapor
THE ROME-TURNEY RADIATOR CO.
Rome, New York
YOUNG RADIATOR CO.
Racine, Wisc.

Condensers, Refrigeration
THE ROME-TURNEY RADIATOR CO.
Rome, New York

Conditioners, Fuel & Lube Oil
See also headings under "Filter", "Purifiers Oil", "Centrifugal Purifiers, Lube & Fuel Oil", "Separators", "Clarifiers, Oil".
COMMERCIAL FILTER CORP.
2 Main St.
Melrose 76, Mass.
INDIANA COMMERCIAL FILTER CORP.
Lebanon, Ind.
THE DE LAVAL SEPARATOR CO.
25 Columbia St.
Poughkeepsie, N. Y.
WM. W. NUGENT & CO., INC.
3426 Cleveland St.
Skokie, Ill.
WINSLOW ENGINEERING CO.
4069 Hollis St.
Emeryville 8, Calif.

Conduit, Flexible & Liquid Tight
AMERICAN BRASS CO.
AMERICAN METAL HOSE DIV.
698 S. Main St.
Waterbury Conn.

Connecting Rod Borers
See also below
KENT-MOORE ORGANIZATION, INC.
28635 Mound Rd.
Warren, Mich.
TOBIN-ARP MFG. CO.
6400 Penn Ave. S.
Minneapolis, Minn.

Connecting Rod Pin Bushing Borer
See above and "Piston Pin Bushing Borer"
TOBIN-ARP MFG. CO.
6400 Penn Ave. S.
Minneapolis, Minn.

Connecting Rods, Forged
See also "Forgings"
ELLWOOD CITY FORGE CO.
Ellwood City, Penna.
ERIE FORGE & STEEL CORP.
1341 W. 16 St.
Erie, Penna.
THE PARK DROP FORGE COMPANY
777 E. 79 St.
Cleveland 3, Ohio

Connecting Rods, Rebuilt
CLEVELAND HONE & MFG. CO.
8816 Harkness Road
Cleveland 6, Ohio

Consulting Engineers
ENGINEERING CO., LTD.
Dr. Alfred J. Buchi
Winterthur, Switzerland

Control Panels
See also "Automatic Control Panels"
CONSOLIDATED DIESEL ELECTRIC CORP.
POWER EQUIPMENT DIV.
880 Canal St.
Stamford, Conn.
KATO ENGINEERING CO.
1443 First Ave.
Mankato, Minn.

Control Systems
CONSOLIDATED DIESEL ELECTRIC CORP.
POWER EQUIPMENT DIV.
880 Canal St.
Stamford, Conn.

Controls, Automatic Starting
See also "Automatic Controls, Starting"
CONSOLIDATED DIESEL ELECTRIC CORP.
POWER EQUIPMENT DIV.
880 Canal St.
Stamford, Conn.
FRANK W. MURPHY MFG., INC.
Box 4537
Tulsa, Okla.

Controls, Engine Safety
See also "Alarm Systems, Pressure & Temperature", "Safety Controls, Engine"
CONSOLIDATED DIESEL ELECTRIC CORP.
POWER EQUIPMENT DIV.
880 Canal St.
Stamford, Conn.
DETROIT CONTROLS CORP.
5900 Trumbull Avenue
Detroit 8, Michigan
MINNEAPOLIS-HONEYWELL
REGULATOR CO.
INDUSTRIAL DIV.
Wayne & Windrim Aves.
Philadelphia 44, Pa.
FRANK W. MURPHY MFG., INC.
Box 4537
Tulsa 1, Okla.
PENN CONTROLS, INC.
Goshen, Indiana
ROBERTSHAW-FULTON CONTROLS CO.
FULTON-SYLPHON DIVISION
P. O. Box 400
Knoxville 1, Tennessee

Controls, Hydraulic
WOODWARD GOVERNOR CO.
N. Second St.
Rockford, Ill.

Controls, Liquid Level
FRANK W. MURPHY MFG., INC.
Box 4537
Tulsa 1, Okla.
ROBERTSHAW-FULTON CONTROLS CO.
FULTON SYLPHON DIV.
P. O. Box 400
Knoxville 1, Tenn.
VIKING INSTRUMENTS, INC.
Towne St.
East Haddam, Conn.

Controls, Pressure
DETROIT CONTROLS CORP.
5900 Trumbull Avenue
Detroit 8, Michigan
MINNEAPOLIS-HONEYWELL
REGULATOR CO., INDUSTRIAL DIV.
Wayne & Windrim Aves.
Philadelphia 44, Pa.
FRANK W. MURPHY MFG., INC.
Box 4537
Tulsa 1, Okla.
PENN CONTROLS, INC.
Goshen, Indiana
VIKING INSTRUMENTS, INC.
Towne Street
East Haddam, Conn.

Controls, Pressure Ratio
AIRESEARCH INDUSTRIAL DIV.
GARRETT CORP.
9225 Aviation Blvd.
Los Angeles 45, Calif.

Controls, Remote
SYNCHRO-START PRODUCTS, INC.
8151 N. Ridgeway Ave.
Skokie, Ill.

Controls, Remote Throttle
VIKING INSTRUMENTS, INC.
Towne Street
East Haddam, Conn.

Controls, Temperature
AMOT CONTROLS CORP.
1st St. & Nevin Ave.
Box 1707
Richmond 1, Calif.
DETROIT CONTROLS CORP.
5900 Trumbull Avenue
Detroit 8, Michigan
ILLINOIS TESTING LABORATORIES, INC.
420 North LaSalle Street
Chicago 10, Illinois
MINNEAPOLIS-HONEYWELL
REGULATOR CO., INDUSTRIAL DIV.
Wayne and Windrim Aves.
Philadelphia 44, Pa.
FRANK W. MURPHY MFG., INC.
Box 4537
Tulsa 1, Okla.
PENN CONTROLS, INC.
Goshen, Indiana
THE POWERS REGULATOR CO.
3400 Oakton St.
Skokie, Illinois
ROBERTSHAW-FULTON CONTROLS CO.
FULTON SYLPHON DIV.
P. O. Box 400
Knoxville 1, Tenn.
VIKING INSTRUMENTS, INC.
Towne Street
East Haddam, Conn.

Controls, Vacuum
FRANK W. MURPHY MFG., INC.
Box 4537
Tulsa 1, Okla.

Converters, AC-DC; DC-AC
KATO ENGINEERING CO.
1443 First Ave.
Manhato, Minn.

Converters, Torque
See also "Torque Converters"
LONG MFG. DIV.
BORG-WARNER CORP.
12501 Dequindre
Detroit 12, Mich.
TWIN DISC CLUTCH CO.
1328 Racine St.
Racine, Wisconsin

Coolant Heaters
See also headings under "Heaters"
DAVIS ENGINEERING CORP.
30 Rockefeller Plaza
New York 20, N. Y.
THE WHITLOCK MFG. CO.
West Hartford 10, Conn.

Coolant Heaters, Electric
KIM HOTSTART MFG. CO.
917 W. Broadway
Spokane 1, Wash.

Coolers, Compressed Air, Gas
See also "Aftercoolers"
DAVIS ENGINEERING CORP.
30 Rockefeller Plaza
New York 20, N. Y.
THE WHITLOCK MFG. CO.
West Hartford 10, Conn.
YOUNG RADIATOR CO.
709 S. Marquette St.
Racine, Wisc.

Coolers, Dry Air
THE WHITLOCK MFG. CO.
West Hartford 10, Conn.

Coolers, Evaporative Type
See also headings under "Evaporators"
YOUNG RADIATOR CO.
709 S. Marquette St.
Racine, Wisc.

Coolers, Jacket Water

See also other "Cooler" headings, headings under "Heat Exchangers", "Plate Heat Exchangers".

AEROFIN CORP.
101 Greenway Ave.
Syracuse 3, N. Y.
ALCO PRODUCTS, INC.
30 Church St.
New York 8, N. Y.
DAVIS ENGINEERING CORP.
30 Rockefeller Plaza
New York 20, N. Y.
PERFEX CORPORATION
500 W. Oklahoma Ave.
Milwaukee 7, Wisc.
THE ROME-TURNEY RADIATOR CO.
Rome, New York
THE WHITLOCK MFG. CO.
West Hartford 10, Conn.
YOUNG RADIATOR CO.
709 S. Marquette St.
Racine, Wisc.

Coolers, Oil, Water

See also "Water Cooling Equipment"; "Exchangers, Heat" and headings under "Heat Exchangers".

AEROFIN CORP.
101 Greenway Ave.
Syracuse 3, N. Y.
DAVIS ENGINEERING CORP.
30 Rockefeller Plaza
New York 20, N. Y.
HARRISON RADIATOR DIV.
GENERAL MOTORS CORP.
Lockport, New York
LONG MFG. DIV.
BORG-WARNER CORP.
12501 Dequindre
Detroit 12, Mich.
PERFEX CORPORATION
500 W. Oklahoma Ave.
Milwaukee 7, Wisc.
THE ROME-TURNEY RADIATOR CO.
Rome, New York
THE SIMS COMPANY, INC.
P. O. Box 1096
Erie, Penna.
THE WHITLOCK MFG. CO.
West Hartford 10, Conn.
YATES-AMERICAN MACHINE CO.
Fourth St.
Beloit, Wisc.
YOUNG RADIATOR CO.
709 S. Marquette St.
Racine, Wisconsin

Cooling Equipment, Engine Radiators

See also "Radiators, Engine Cooling"

AEROFIN CORP.
101 Greenway Ave.
Syracuse 3, N. Y.
HARRISON RADIATOR DIVISION
GENERAL MOTORS CORP.
Lockport, New York
PERFEX CORPORATION
500 W. Oklahoma Ave.
Milwaukee 7, Wisc.
THE ROME-TURNEY RADIATOR CO.
Rome, New York
YOUNG RADIATOR CO.
709 S. Marquette St.
Racine, Wisc.

Cooling System Descaling Compounds

See also "Engine Cooling System Cleaners" "Engine Cooling System Rust Preventive"

MAGNUSON PRODUCTS CORP.
50 Court St.
Brooklyn 1, New York
R. M. HOLLINGSHEAD CORP.,
PERRY FILTER DIVISION
840 Cooper St.
Camden 2, N. J.

Cooling Tower Fans

KOPPERS CO., INC.
METAL PRODUCTS DIV.
200 Scott St.
Baltimore 3, Md.

Corrosion Inhibitors

YOUNG RADIATOR CO.
709 S. Marquette St.
Racine, Wisc.

Couplings

See also heading under "Flexible Drives".

DIAMOND CHAIN COMPANY, INC.
402 Kentucky Avenue
Indianapolis 7, Indiana
KOPPERS CO., INC.
METAL PRODUCTS DIV.
200 Scott St.
Baltimore 29, Md.
THOMAS FLEXIBLE COUPLING CO.
Main Avenue & Biddle Street
Warren, Pennsylvania

Couplings, Chain

DIAMOND CHAIN COMPANY, INC.
402 Kentucky Avenue
Indianapolis 7, Indiana

Couplings, Flexible

AJAX FLEXIBLE COUPLING CO., INC.
Portage & English St.
Westfield, N. Y.
DIAMOND CHAIN CO., INC.
402 Kentucky Ave.
Indianapolis 7, Indiana
ELLIOTT COMPANY
Jeannette, Pa.
KOPPERS CO., INC.
METAL PRODUCTS DIV.
200 Scott St.
Baltimore 29, Maryland
LOVEJOY FLEXIBLE COUPLING CO.
4866 W. Lake St.
Chicago 44, Ill.
THOMAS FLEXIBLE COUPLING CO.
Main Avenue & Biddle Street
Warren, Pennsylvania

Couplings, Flexible Shaft

DIAMOND CHAIN CO., INC.
402 Kentucky Ave.
Indianapolis 7, Indiana
THOMAS FLEXIBLE COUPLING CO.
Main Ave. & Biddle St.
Warren, Pa.

Couplings, Floating Shaft Type

AJAX FLEXIBLE COUPLING CO., INC.
Portage & English St.
Westfield, N. Y.
KOPPERS CO., INC.
METAL PRODUCTS DIV.
200 Scott St.
Baltimore 29, Maryland
THOMAS FLEXIBLE COUPLING CO.
Main Avenue & Biddle Street
Warren, Pa.

Couplings, Fluid

See also headings under "Converters Torque".

TWIN DISC CLUTCH CO.
1328 Racine St.
Racine, Wisconsin

Couplings, Hydraulic, Quick Disconnect, Self Sealing

See also headings under "Fittings Hose Detachable".

AEROQUIP CORP.
300 S. East Ave. Jackson Mich.
3015 Winona Ave., Burbank, Calif.

Couplings, Roller Chain

DIAMOND CHAIN CO., INC.
402 Kentucky Ave.
Indianapolis 7, Indiana

Couplings, Self-Aligning

AJAX FLEXIBLE COUPLING CO., INC.
Portage & English St.
Westfield, N. Y.
KOPPERS CO., INC.
METAL PRODUCTS DIV.
200 Scott St.
Baltimore 29, Maryland
THOMAS FLEXIBLE COUPLING CO.
Main Avenue & Biddle Street
Warren, Pennsylvania

Couplings, Shaft, Rigid

KOPPERS CO., INC.
METAL PRODUCTS DIV.
200 Scott St.
Baltimore 29, Md.
LOVEJOY FLEXIBLE COUPLING CO.
4866 W. Lake St.
Chicago 44, Ill.

Cranking Motors, Electric

See also headings under "Starting Motors".

DELCO-REMY DIV.
GENERAL MOTORS CORP.
2401 Columbus Ave.
Anderson, Ind.

Cranking Motors, Gasoline

HERCULES MOTOR CORP.
101 11th S. E.
Canton 2, Ohio

Cranking Motors, Hydraulic

AMERICAN BOSCH ARMA CORP.,
AMERICAN BOSCH DIV.
3664 Main St.
Springfield 7, Mass.

Crankshaft Bearings

CLEVELAND GRAPHITE BRONZE CO.
(DIV. OF CLEVITE CORP.)
17000 St. Clair Ave.
Cleveland 10, Ohio

Crankshaft, Chrome Plated

MORCO, INC.
22201 Aurora Rd.
Bedford, Ohio

Crankshaft Exchanged

MORCO INC.
22201 Aurora Road
Bedford, Ohio

Crankshaft Forgings

See also headings under "Forgings Iron & Steel", "Forgings, Drop"

ERIE FORGE & STEEL CORP.
Erie, Penna.
NATIONAL FORGE & ORDNANCE CO.
Irvine, Warren County, Pa.
WYMAN-GORDON CO.
105 Madison St.
Worcester, Mass.

Crankshaft Grinders

See also under "Grinders".

VAN NORMAN AUTOMOTIVE
EQUIPMENT CO.
3640 Main Street
Springfield 7, Mass.
WINONA TOOL MFG. CO.
1430 W. 6th
Winona, Minn.

Crankshaft Grinding

LANE PLATING WORKS
5233 Bonnie View Rd.
P. O. Box 9115
Dallas 15, Texas
MORCO, INC.
22201 Aurora Rd.
Bedford, Ohio
WINONA TOOL MFG. CO.
1430 W. 6th
Winona, Minn.

Crankshaft Machinists

ELLWOOD CITY FORGE CO.
10th St.
Ellwood City, Pa.

MORCO, INC.
22201 Aurora Rd.
Bedford, Ohio

Crankshaft, Plating

VAN DER HORST CORP. OF AMERICA
1313 E. State St.
Olean, N. Y.
VAN DER HORST CORP. OF AMERICA
Grove & Delph St.
Tarrell, Texas
VAN DER HORST CORP. OF AMERICA
2610 S. Shields Avenue
Chicago, Illinois

Crankshaft Repairs

See also "Repairs, Diesel"

CLEVELAND HONE & MFG. CO.
8816 Harkness Rd.
Cleveland 6, Ohio
METALOCK REPAIR SERVICE, INC.
36-15 48 Ave.
Long Island City 1, N. Y.
METALOCK REPAIR SERVICE, INC.
1200 E. 16th St.
Los Angeles, Calif.
METALOCK REPAIR SERVICE, INC.
7117 Navigation Blvd.
Houston, Texas
MORCO INC.
22201 Aurora Road
Bedford, Ohio
NATIONAL FORGE & ORDNANCE CO.
Irvine, Warren County, Pa.

Crankshafts

ELLWOOD CITY FORGE CO.
10th St.
Ellwood City, Pa.
ERIE FORGE & STEEL CORP.
1341 W. 16 St.
Erie, Pa.
MORCO, INC.
22201 Aurora Rd.
Bedford, Ohio
NATIONAL FORGE & ORDANCE CO.
Irvine, Warren County, Pa.
THE PARK DROP FORGE CO.
777 E. 79
Cleveland 3, Ohio
WYMAN-GORDON CO.
105 Madison St.
Worcester, Mass.

Crankshafts, Chromium Plated

See also under heading "Plating, Chrome".

CLEVELAND HONE & MFG. CO.
8816 Harkness Road
Cleveland 6, Ohio
LANE PLATING WORKS
5322 Bonnie View Rd.
P. O. Box 9115
Dallas 15, Texas
MORCO, INC.
22201 Aurora Rd.
Bedford, Ohio
NATIONAL FORGE & ORDNANCE CO.
Irvine, Warren County, Pa.
VAN DER HORST CORP. OF AMERICA
1313 E. State St.
Olean, N. Y.
VAN DER HORST CORP. OF AMERICA
Grove & Delph St.
Tarrell, Texas
VAN DER HORST CORP. OF AMERICA
2610 S. Shields Avenue
Chicago, Illinois

Crawler-Tractors

INTERNATIONAL HARVESTER CO.
180 N. Michigan Ave.
Chicago 1, Ill.

Cutting Oils

NATIONAL REFINING CO.
P. O. Box 6479
Cleveland 1, Ohio

Cylinder Head Grinders

See also under "Grinders"

VAN NORMAN AUTOMOTIVE EQUIPMENT CO.
3640 Main St.
Springfield 7, Mass.

Cylinder Heads Repaired

METALOCK REPAIR SERVICE, INC.
36-15 48th Ave.
Long Island City 1, New York
METALOCK REPAIR SERVICE, INC.
1200 E. 16th St.
Los Angeles, Calif.
METALOCK REPAIR SERVICE, INC.
7117 Navigation Blvd.
Houston, Texas
SALSBURY CORP.
1161 E. Florence Ave.
Los Angeles 1, Calif.
RALPH STARK, INC.
43-12 33rd St.
Long Island City 1, N. Y.

Cylinder Liner Pullers

KENT-MOORE ORGANIZATION, INC.
28625 Mound Rd.
Warren, Mich.

Cylinder Liners

SEALED POWER CORP.
2001 Sanford St.
Muskegon, Mich.

Cylinder Liners Reclaimed

See also under "Plating, Chrome", "Repairs, Diesel".

CHROMIUM CORP. OF AMERICA
100 Park Ave.
New York 7, N. Y.
METAL FINISHERS, INC.
1725 E. 27th St.
Cleveland 14, Ohio
SPAR-TAN ENGINEERING CO.
446 Bauchet St.
Los Angeles 12, Calif.

Cylinder Liners Repaired

See also under heading "Repairs, Diesel".

METALOCK REPAIR SERVICE, INC.
36-15 48th Ave.
Long Island City 1, New York
METALOCK REPAIR SERVICE, INC.
1200 E. 16th St.
Los Angeles, Calif.
METALOCK REPAIR SERVICE, INC.
7117 Navigation Blvd.
Houston, Texas
VAN DER HORST CORP. OF AMERICA
1313 E. State St.
Olean, N. Y.
VAN DER HORST CORP. OF AMERICA
Grove & Delph St.
Tarrell, Texas
VAN DER HORST CORP. OF AMERICA
2610 S. Shields Avenue
Chicago, Illinois

Cylinders Hydraulic

ERIE FORGE & STEEL CORP.
1341 W. 16 St.
Erie, Pa.

Damper, Torsional Vibration

See also "Vibration"

HOUDAILLE INDUSTRIES, INC.
BUFFALO HYDRAULICS DIV.
537 E. Delavan Ave.
Buffalo 11, N. Y.
SCHWITZER CORP.
1125 Massachusetts Avenue
Indianapolis 7, Indiana

Dehydrators, Diesel Fuel

THE BRIGGS FILTRATION CO.
River Rd.
Washington 16, D. C.
THE DE LAVAL SEPARATOR CO.
25 Columbia St.
Poughkeepsie, N. Y.

Detergents

See also under headings "Carbon Solvents", "Cleaning Compounds", and other "Solvent" headings.

BRULIN & COMPANY, INC.
2939-45 Columbia Ave.
Indianapolis 7, Ind.
MAGNUSON PRODUCTS CORP.,
50 Court St.
Brooklyn 1, New York

Dew Point Meters

ILLINOIS TESTING LABORATORIES, INC.
420 North LaSalle Street
Chicago 10, Illinois

Diesel and Gas Engines

ENGINEERING CO., LTD.
Dr. Alfred J. Buchi
Winterthur, Switzerland

Diesel Buses

AMERICAN M-A-N CORPORATION
149 Broadway
New York 6, N. Y.

Diesel Cylinder Pressure Indicators

KIENE DIESEL ACCESSORIES, INC.
10352 Pacific Ave.
Franklin Park, Ill.

Diesel Engine Lubricating Oil

See also under "Automotive Lube Oils, Lubricants", "Lubricating Oils"

THE CALIFORNIA OIL CO.
1200 State St.
Perth Amboy, N. J.
CITIES SERVICE OIL CO.
60 Wall Tower
New York 5, N. Y.
NATIONAL REFINING CO.
P. O. Box 6479
Cleveland 1, Ohio
SHELL OIL CO.
South W. 50th St.
New York 20, N. Y.
THE TEXAS COMPANY
135 East 42nd Street
New York 17, N. Y.

Diesel Engines, Reconditioned

See also "Repairs Diesel"

LEO M. SHANAHAN CO.
4274 S. Hoover St.
Los Angeles 37, Calif.
NATIONAL METAL & STEEL CORP.
1251 New Dock St.
Terminal Island, Calif.
STEWART & STEVENSON SERVICES, INC.
4516 Harrisburg
Houston, Texas

Diesel Engines, Vertical Applications

STEWART & STEVENSON SERVICES, INC.
4516 Harrisburg
Houston, Texas

Diesel Farm Tractors

ALLIS-CHALMERS MFG. CO.
MATERIALS HANDLING DIVISION
1135 S. 70 St.
Milwaukee 1, Wisc.
AMERICAN M-A-N CORPORATION
149 Broadway
New York 6, N. Y.
DIESEL ENERGY CORP.
82 Beaver St.
New York 5, N. Y.
INTERNATIONAL HARVESTER CO.
180 N. Michigan Ave.
Chicago 1, Ill.

Diesel Fuel Injection, Reconditioned

HANCOCK DIESEL SERVICE CO.
300 Walnut St.
Findlay, Ohio

Diesel Fuel Injector Repair

INTERSTATE DIESEL SERVICE, INC.
2093 East 19 St.
Cleveland 15, Ohio

Diesel Fuel Oil Tar & Carbon Dispersing Agent

E. I. DU PONT DE NEMOURS & CO., INC.
PETROLEUM CHEMICAL DIV.
Wilmington 98, Del.

R. S. NORRIS & ASSOCIATES
26 Valley Rd.
Larchmont, N. Y.

Diesel, Fuel Pump Service

FLORIDA DIESEL & ELECTRIC CO.
1930 N. Miami Ave.
Miami 36, Fla.

Diesel Generating Sets

See also list under "Auxiliary Diesel Generating Sets".

ALCO PRODUCTS, INC.
30 Church St.
New York 8, N. Y.

ALLIS-CHALMERS MFG. CO.
MATERIALS HANDLING DIV.
1135 S. 70 St.
Milwaukee 1, Wisc.

AMERICAN M-A-N CORPORATION
149 Broadway
New York 6, N. Y.

AMERICAN MARC, INC.
1601 West Florence Ave.
Inglewood, Calif.

BALDWIN-LIMA-HAMILTON CORP.
N. 3rd St.
Hamilton, Ohio

BURMEISTER & WAIN AMERICAN CORP.
Mystic, Conn.

CHICAGO PNEUMATIC TOOL CO.
6 East 44 St.
New York 17, N. Y.

CLEVELAND DIESEL ENGINE DIV.
GENERAL MOTORS CORP.
2160 W. 106th St.
Cleveland 11, Ohio

CONSOLIDATED DIESEL ELECTRIC CORP.
POWER EQUIPMENT DIVISION
880 Canal Street
Stamford, Conn.

COOPER-BESSEMER CORP.
Mount Vernon, Ohio

DIESEL ENERGY CORP.
82 Beaver St.
New York 5, N. Y.

ELECTRO-MOTIVE DIV.
GENERAL MOTORS CORP.
La Grange, Ill.

ENTERPRISE ENGINE & MACH. CO.
18th & Florida Streets
San Francisco 10, Calif.

INGERSOLL-RAND COMPANY
11 Broadway
New York 4, New York

LISTER-BLACKSTONE, INC.
42-32 21st St.
Long Island City 1, N. Y.

MASCHINENBAU KIEL AKTIENGESELLSCHAFT
Kiel-Friedrichsort
Germany (Western)

NATIONAL METAL & STEEL CORP.
1251 New Dock St.
Terminal Island, Calif.

NORDBERG MFG. CO.
3073 S. Chase Ave.
Milwaukee 1, Wisconsin

ORENDA INDUSTRIAL, INC.
34-14 58th St.
Woodside 77, N. Y.

P & H DIESEL DIVISION
HARNISCHFEGER CORPORATION
500 So. Main St.
Crystal Lake, Illinois

LEO M. SHANAHAN CO.
4274 S. Hoover St.
Los Angeles 37, Calif.

R. H. SHEPPARD CO., INC.
Hanover, Pennsylvania

STERLING ENGINE CO., INC.
Menominee, Mich.

STEWART & STEVENSON SERVICES, INC.
4516 Harrisburg
Houston, Texas

WAUKESHA MOTOR CO.
W. St. Paul Ave.
Waukesha, Wisc.

THE WHITE MOTOR CO.
WHITE DIESEL ENGINE DIV.
1401 Sheridan Ave.
Springfield, Ohio

WORTHINGTON CORPORATION
Worthington Ave.
Harrison, New Jersey

Diesel Industrial Tractors

ALLIS-CHALMERS MFG. CO.
MATERIALS HANDLING DIV.
1135 S. 70 St.
Milwaukee 1, Wisc.

AMERICAN M-A-N CORP.
149 Broadway
N. Y. 16, N. Y.

LEO M. SHANAHAN CO.
4274 S. Hoover St.
Los Angeles 37, Calif.

Diesel Locomotives, Electrical and Mechanical Drive

See also under "Locomotive" headings.

ALCO PRODUCTS, INC.
30 Church St.
New York 8, N. Y.

AMERICAN M-A-N CORP.
149 Broadway
New York 6, N. Y.

Diesel Marine Engines

WAUKESHA MOTOR CO.
West St. Paul Ave.
Waukesha, Wisc.

Diesel Nozzle Testers

See also under "Nozzle Testers", "Injection Test Stand", "Tester Nozzle".

BACHARACH INDUSTRIAL INSTRUMENT CO.
7301 Penn Ave.
Pittsburgh 8, Pa.

C.A.V. (Fuel Injection Equipment) DIVISION OF LUCAS ELECTRICAL SERVICES, INC.
14820 Detroit Ave.
Cleveland 7, Ohio

KENT-MOORE ORGANIZATION, INC.
28635 Mound Rd.
Warren, Mich.

KIENE DIESEL ACCESSORIES, INC.
10352 Pacific Avenue
Franklin Park, Illinois

MARINE PUMPS, INC.,
SPIRALAP & UNITEST DIVISION
226 N. Marine Ave.
Wilmington, Calif.

R. H. SHEPPARD CO., INC.
109 Middle St.
Hanover, Pa.

Diesel Power Units

See "Auxiliary Diesel . . . ." listings.

ALCO PRODUCTS, INC.
30 Church St.
New York 8, N. Y.

ALLIS-CHALMERS MFG. CO.
MATERIALS HANDLING DIV.
1135 S. 70 St.
Milwaukee 1, Wisc.

AMERICAN M-A-N CORP.
149 Broadway
New York 6, N. Y.

AMERICAN MARC, INC.
1601 W. Florence Ave.
Inglewood, Calif.

BALDWIN-LIMA-HAMILTON CORP.
545 N. 3rd St.
Hamilton, Ohio

BURMEISTER & WAIN AMERICAN CORP.
Mystic, Conn.

CLEVELAND DIESEL ENGINE DIV.
GENERAL MOTORS CORP.
2160 W. 106th St.
Cleveland 11, Ohio

CONSOLIDATED DIESEL ELECTRIC CORP.
POWER EQUIPMENT DIVISION
880 Canal Street
Stamford, Conn.

COOPER-BESSEMER CORP.
Mount Vernon, Ohio

DETROIT DIESEL ENGINE DIV.
GENERAL MOTORS CORP.
13400 W. Outer Drive
Detroit 28, Mich.

DIESEL ENERGY CORP.
82 Beaver St.
New York 5, N. Y.

HERCULES MOTOR CORP.
101-11th S. E.
Canton 2, Ohio

INGERSOLL-RAND COMPANY
11 Broadway
New York 4, New York

INTERNATIONAL HARVESTER CO.
180 N. Michigan Ave.
Chicago 1, Ill.

MAK MASCHINENBAU KIEL A. G.
Kiel-Friedrichsort
Kiel, West Germany

NATIONAL METAL & STEEL CORP.
1251 New Dock St.
Terminal Island, Calif.

NORDBERG MFG. CO.
3073 S. Chase Ave.
Milwaukee 1, Wisconsin

P & H DIESEL ENGINE DIVISION,
HARNISCHFEGER CORP.
500 S. Main St.
Crystal Lake, Ill.

F. PERKINS (CANADA) LTD.
60 Wingold Ave.
Toronto 10, Ontario

LEO M. SHANAHAN CO.
4274 S. Hoover St.
Los Angeles 37, Calif.

R. H. SHEPPARD CO., INC.
Hanover, Pa.

STEWART & STEVENSON SERVICES, INC.
4516 Harrisburg
Houston, Texas

WAUKESHA MOTOR CO.
W. St. Paul Ave.
Waukesha, Wisc.

WHITE DIESEL ENGINE DIV.
THE WHITE MOTOR CO.
1401 Sheridan Ave.
Springfield, Ohio

WORTHINGTON CORP.
Worthington Ave.
Harrison, N. J.

Diesel Pumping Units

See also "Pumping Units, Diesel".

ALLIS-CHALMERS MFG. CO.
MATERIALS HANDLING DIV.
1135 S. 70 St.
Milwaukee 1, Wisc.

AMERICAN M-A-N CORP.
149 Broadway
New York 6, N. Y.

AMERICAN MARC, INC.
1601 West Florence Ave.
Inglewood, Calif.

BURMEISTER & WAIN AMERICAN CORPORATION
Mystic, Conn.

DIESEL ENERGY CORP.
82 Beaver St.
New York 5, N. Y.

INGERSOLL-RAND COMPANY
11 Broadway
New York 4, New York

R. H. SHEPPARD CO., INC.
Hanover, Pa.

WHITE DIESEL ENGINE DIV.
THE WHITE MOTOR CO.
1401 Sheridan Ave.
Springfield, Ohio

Diesel Railway Generating Sets

See "Auxiliary Diesel . . . ." listings.

CONSOLIDATED DIESEL ELECTRIC CORP.
POWER EQUIPMENT DIVISION
880 Canal Street
Stamford, Conn.

DIESEL ENERGY CORP.
82 Beaver St.
New York 5, N. Y.

NORDBERG MFG. CO.
3073 S. Chase Ave.
Milwaukee 1, Wisconsin

STERLING ENGINE CO., INC.
Menominee, Mich.

WAUKESHA MOTOR CO.
West St. & Paul Ave.
Waukesha, Wisc.

Diesel Schools

STEWART & STEVENSON SERVICES, INC.
4516 Harrisburg
Houston, Texas

Diesel Starting Fluid

See also "Fluid, Diesel Starting"

THE CALIFORNIA OIL CO.
1200 State St.
Perth Amboy, N. J.

SPRAY PRODUCTS CORP.
P. O. Box 584
Camden, N. J.

Diesel Testing Equipment

See also "Indicator" headings, "Tester" headings, "Nozzle Testers", "Injection Test Stand".

BACHARACH INDUSTRIAL INSTRUMENT CO.
200 N. Braddock Ave.
Pittsburgh 8, Penna.

DIESEL INJECTION SALES & SERVICE, INC.
808 Union St.
Norfolk, Va.

KENT-MOORE ORGANIZATION, INC.
28635 Mound Rd.
Warren, Mich.

KIENE DIESEL ACCESSORIES, INC.
10352 Pacific Avenue
Franklin Park, Illinois

KISTLER INSTRUMENT CORP.
15 Webster St.
North Tonawanda, N. Y.

LENGOR, INC.
Towns-Worth Bldg.
Annapolis, Md.

Diesel Truck-Tractors

AMERICAN M-A-N CORP.
149 Broadway
New York 6, N. Y.

DIESEL ENERGY CORP.
82 Beaver St.
New York 5, N. Y.

LEO M. SHANAHAN CO.
4274 S. Hoover St.
Los Angeles 37, Calif.

Drills, Portable Electric

ALBERTSON & CO., INC.
Sioux City, Iowa

Drives, Accessory

SCHWITZER CORP.
1125 Massachusetts Ave.
Indianapolis 7, Ind.

Drives, Chain

See also under "Chain" listings "Camshaft Drives, Roller Chain".

DIAMOND CHAIN CO., INC.
402 Kentucky Ave.
Indianapolis, Ind.

Drives, Gear

See also headings under "Gears" and "Marine".

BRAD FOOTE GEAR WORKS
1315 South Cicero Ave.
Cicero 50, Illinois

Drives, Starter

See also "Starter Drives"

ECLIPSE MACHINE DIV.
BENDIX AVIATION CORP.
Elmira, N. Y.

Dual-Engine Chain Drives

DIAMOND CHAIN CO., INC.
402 Kentucky Ave.
Indianapolis 7, Ind.

Dynamometers, Chassis

CLAYTON MFG. CO.
El Monte, Calif.

Dynamometers, Engine

CLAYTON MFG. CO.
El Monte, Calif.

EATON MFG. CO.
739 East 140th St.
Cleveland 10, Ohio

TAYLOR DYNAMOMETER & MACHINE CO.
6411 River Parkway
Milwaukee 13, Wisc.

Dynamometers and Prony Brakes

CLAYTON MFG. CO.
El Monte, Calif.

TAYLOR DYNAMOMETER & MACHINE CO.
6411 River Parkway
Milwaukee 13, Wisc.

Electrical Connectors

SCINTILLA DIVISION
BENDIX AVIATION CORP.
Sidney, New York

Emergency Diesel Generator Systems

See also headings under "Auxiliary Diesel . . . ."

ALLIS-CHALMERS MFG. CO.
MATERIALS HANDLING DIV.
1135 S. 70 St.
Milwaukee 1, Wisc.

BURMEISTER & WAIN AMERICAN CORP.
Mystic, Conn.

CHICAGO PNEUMATIC TOOL CO.
6 East 44th St.
New York 17, N. Y.

CLEVELAND DIESEL ENGINE DIV.
GENERAL MOTORS CORP.
2160 W. 106th St.
Cleveland 11, Ohio

CONSOLIDATED DIESEL ELECTRIC CORP.
POWER EQUIPMENT DIVISION
880 Canal Street
Stamford, Conn.

DETROIT DIESEL ENGINE DIV.
GENERAL MOTORS CORP.
13400 W. Outer Dr.
Detroit 28, Mich.

DIESEL ENERGY CORP.
82 Beaver St.
New York 5, N. Y.

NATIONAL METAL & STEEL CORP.
1251 New Dock St.
Terminal Island, Calif.

NORDBERG MFG. CO.
3073 S. Chase Ave.
Milwaukee 1, Wisc.

D. W. ONAN & SONS, INC.
2515 University Ave. SE
Minneapolis 14, Minn.

ORENDA INDUSTRIAL, INC.
34-14 58th St.
Woodside 77, N. Y.

P&H DIV.
HARNISCHFEGER CORP.
500 S Main
Crystal Lake, Ill.

R. H. SHEPPARD CO., INC.
Hanover, Pa.

STERLING ENGINE CO., INC.
Menominee, Mich.

WAUKESHA MOTOR CO.
West St. Paul Ave.
Waukesha Wisc.

WHITE DIESEL ENGINE DIVISION
THE WHITE MOTOR COMPANY
1401 Sheridan Avenue
Springfield, Ohio

Emergency Lighting Batteries

NIFE INC.
Lambert Ave.
Copiague, N. Y.

Emergency Lighting Plants

See also heading above.

ALLIS-CHALMERS MFG. CO.
MATERIALS HANDLING DIV.
1135 S. 70 St.
Milwaukee 1, Wisc.

CONSOLIDATED DIESEL ELECTRIC CORP.
POWER EQUIPMENT DIVISION
880 Canal Street
Stamford, Conn.

LISTER-BLACKSTONE, INC.
42-32 21 St.
Long Island City 1, N. Y.

D. W. ONAN & SONS, INC.
2515 University Ave. SE
Minneapolis 14, Minn.

ORENDA INDUSTRIAL, INC.
34-14 58th St.
Woodside 77, N. Y.

STERLING ENGINE CO., INC.
Menominee, Mich.

WAUKESHA MOTOR CO.
West St. Paul Ave.
Waukesha, Wisc.

WHITE DIESEL ENGINE DIVISION
THE WHITE MOTOR COMPANY
1401 Sheridan Avenue
Springfield, Ohio

Emergency Lighting Systems

BURMEISTER & WAIN AMERICAN CORP.
Mystic, Conn.

CONSOLIDATED DIESEL ELECTRIC CORP.
POWER EQUIPMENT DIVISION
880 Canal Street
Stamford, Conn.

EXIDE INDUSTRIAL DIV.
THE ELECTRIC STORAGE BATTERY CO.
42 S. 15 St.
Philadelphia 2, Pa.

NICAD DIVISION, GOULD NATIONAL BATTERIES, INC.
176 Pleasant St.
Easthampton 6, Mass.

THE WHITE MOTOR COMPANY
WHITE DIESEL ENGINE DIVISION
1401 Sheridan Avenue
Springfield, Ohio

Enclosed Gear Drives

BRAD FOOTE GEAR WORKS, INC.
1315 South Cicero Ave.
Cicero 50, Illinois

Engine Cooling System Cleaners

See also "Engine Cooling System Rust Preventative," "Cooling System" headings, "Cooling System Descaling Compounds", "Exchangers, Heat Materials for Cleaning".

MAGNUSON PRODUCTS CORP.
50 Court St.
Brooklyn 1, New York

Engine Cooling System Rust Preventives

SALSBURY CORP.
1161 E. Florence Ave.
Los Angeles 1, Calif.

Engine, Preheaters, Electric

TECH PRODUCTS, INC.
615 Pennsylvania Ave.
Elizabeth, New Jersey

Engine Starting Primer

START PILOT CORP.
61 Second St.
Mineola, N. Y.

Engines, Diesel, Used

See also under "Diesel Engines, Reconditioned"

NATIONAL METAL & STEEL CORP.
1251 New Dock St.
Terminal Island, Calif.

Engineering, Consulting and Designing
ENGINEERING COMPANY, LTD.
Dr. Alfred J. Buchi
Winterthur, Switzerland

Engines, Diesel and Gas
ENGINEERING COMPANY, LTD.
Dr. Alfred J. Buchi
Winterthur, Switzerland

Evaporators
See also "Coolers"
ALCO PRODUCTS, INC.
30 Church St.
New York 8, N. Y.
THE MAXIM SILENCER CO.
SUBSIDIARY, EMHART MFG. CO.
85 Homestead Ave.
Hartford, Conn.
YOUNG RADIATOR COMPANY
709 South Marquette St.
Racine, Wisconsin

Evaporators, Exhaust Gas
DAVIS ENGINEERING CORP.
30 Rockefeller Plaza
New York 20, N. Y.

Evaporators, Steam
DAVIS ENGINEERING CORP.
30 Rockefeller Plaza
New York 20, N. Y.
THE MAXIM SILENCER CO.
SUBSIDIARY, EMHART MFG. CO.
85 Homestead Ave.
Hartford, Conn.

Exchange Fuel Injector Service
INTERSTATE DIESEL SERVICE, INC.
2093 East 19 St.
Cleveland 15, Ohio

Exchangers, Heat
See also under "Heat Exchanger", headings
AEROFIN CORP.
101 Greenway Ave.
Syracuse 3, N. Y.
ALCO PRODUCTS, INC.
30 Church St.
New York 8, N. Y.
AMERICAN M-A-N CORP.
149 Broadway
New York 6, N. Y.
DAVIS ENGINEERING CORP.
30 Rockefeller Plaza
New York 20, N. Y.
HARRISON RADIATOR DIVISION
GENERAL MOTORS CORP.
Washburn Street
Lockport, New York
PERFEX CORPORATION
500 West Oklahoma Ave.
Milwaukee 7, Wisc.
ROME-TURNEY RADIATOR CO.
Rome, New York
THE WHITLOCK MFG. CO.
West Hartford 10,
Connecticut
YATES-AMERICAN MACHINE CO.
Fourth Street
Beloit, Wisconsin
YOUNG RADIATOR COMPANY
709 S. Marquette St.
Racine, Wisconsin

Exchangers, Heat, Materials for Cleaning
See also, "Engine Cooling System Cleaners"
MAGNUSON PRODUCTS CORP.
50 Court Street
Brooklyn 1, N. Y.

Expansion Joints
See also headings under "Flexible . . . ."
BADGER MANUFACTURING CO.
230 Bent St.
Cambridge, Mass.
FLEXONICS CORPORATION
1363 So. 3rd Avenue
Maywood, Illinois

Expansion Joints, Corrugated, Stainless Steel
FLEXONICS CORP.
1363 S. 3rd Ave.
Maywood, Ill.

Fan Drives
BROWN BOVERI CORP.
19 Rector Street
New York 6, N. Y.
SCHWITZER CORP.
1125 Massachusetts Ave.
Indianapolis 7, Indiana

Fan Drives, Modulated & Thermo-Modulated
SCHWITZER CORP.
1125 Massachusetts Ave.
Indianapolis 7, Ind.

Fans, Axial Flow
SCHWITZER CORP.
1125 Massachusetts Avenue
Indianapolis 7, Indiana

Fans, Centrifugal
AMERICAN AIR FILTER CO., INC.
215 Central Ave.
Louisville 8, Ky.

Fans, Radiator Cooling
See also "Radiators"
SCHWITZER CORP.
1125 Massachusetts Ave.
Indianapolis 7, Indiana

Fill Signals
ROCHESTER MFG. CO., INC.
Rockwood St.
Rochester 10, N. Y.

Filter Cartridges
COMMERCIAL FILTER CORP.
2 Main St.
Melrose 76, Mass.
INDIANA COMMERCIAL FILTER CORP.
Lebanon, Ind.

Filter Elements
See also under "Filters"
COMMERCIAL FILTER CORP.
2 Main St.
Melrose 76, Mass.
DE LUXE PRODUCTS CORP.
1201 Michigan Blvd.
Racine, Wisconsin
INDIANA COMMERCIAL FILTER CORP.
Lebanon, Ind.
LUBER FINER INC.
2514 South Grand Avenue
Los Angeles 7, Calif.
WM. W. NUGENT & CO., INC.
3426 Cleveland Street
Skokie, Illinois

Filtering Systems
See also under "Oil Purification Systems" headings
COMMERCIAL FILTER CORP.
2 Main St.
Melrose 76, Mass.
INDIANA COMMERCIAL FILTER CORP.
Lebanon, Indiana
LUBER FINER INC.
2514 So. Grand
Los Angeles 7, Calif.
WM. W. NUGENT & CO., INC.
3426 Cleveland Street
Skokie, Illinois

Filters, Air
See also "Air Filters"; and Headings under
AMERICAN AIR FILTER CO., INC.
215 Central Ave.
Louisville 8, Ky.
DONALDSON COMPANY INC.
666 Pelham Blvd.
St. Paul 14, Minn.
FRAM CORPORATION
Providence 16, Rhode Island
PUROLATOR PRODUCTS, INC.
970 New Brunswick Avenue
Rahway, New Jersey
VORTOX CO.
121 S. Alexander Ave.
Claremont, Calif.
WIX CORPORATION
1211 Ozark
Gastonia, N. Car.

Filters, Air, Automatic Self-Cleaned
AIR-MAZE CORPORATION
25000 Miles Road
Cleveland 28, Ohio
AMERICAN AIR FILTER CO.
215 Central Ave.
Louisville 8, Ky.
DONALDSON COMPANY INC.
666 Pelham Blvd.
St. Paul 14, Minn.

Filters, Air, Dry Type
DONALDSON COMPANY, INC.
666 Pelham Blvd.
St. Paul 14, Minn.
FRAM CORPORATION
Providence 16, R. I.
PUROLATOR PRODUCTS, INC.
970 New Brunswick Ave.
Rahway, N. J.
WIX CORPORATION
Gastonia, N. C.

Filters, Air, Dry Type (Crankcase)
PUROLATOR PRODUCTS, INC.
970 New Brunswick Ave.
Rahway, N. J.

Filters, Air, Oil Bath Type
AIR MAZE CORP.
25000 Miles Road
Cleveland 28, Ohio
AMERICAN AIR FILTER CO.
215 Central Ave.
Louisville 8, Ky.
DONALDSON COMPANY, INC.
666 Pelham Blvd.
St. Paul 14, Minnesota
VORTOX COMPANY
121 South Alexander Avenue
Claremont, California

Filters, Air, Open-Screen Type
DONALDSON COMPANY INC.
666 Pelham Blvd.
St. Paul 14, Minn.

Filters, Air, Panel Type
AIR-MAZE CORPORATION
25000 Miles Road
Cleveland 28, Ohio
VORTOX COMPANY
121 South Alexander Avenue
Claremont, California

Filters, Lubricating Oil
AIR MAZE CORPORATION
25000 Miles Road
Cleveland 28, Ohio

Filters, (Centrifugal) Lube Oil
THE DE LAVAL SEPARATOR CO.
25 Columbia St.
Poughkeepsie, N. Y.

Filters, Compressed Air
COMMERCIAL FILTER CORP.
2 Main St.
Melrose 76, Mass.
CUNO ENGINEERING CORP.
64 S. Vine St.
Meriden, Connecticut
INDIANA COMMERCIAL FILTER CORP.
Lebanon Ind.

WM. W. NUGENT & CO., INC.
3426 Cleveland Street
Skokie, Illinois
PUROLATOR PRODUCTS, INC.
970 New Brunswick Avenue
Rahway, New Jersey

Filters, Compressed Air and Gas

BRIGGS FILTRATION CO.
River Road
Washington 16, D. C.

Filters, Cooling System

R. M. HOLLINGSHEAD CORP.
PERRY FILTER DIVISION
840 Cooper Street
Camden 2, N. J.

Filters, Cutting Oil

COMMERCIAL FILTER CORP.
2 Main St.
Melrose 76, Mass.
INDIANA COMMERCIAL CORP.
Lebanon, Ind.

Filters, 5-Micron, Diesel Fuel

C.A.V. FUEL INJECTION EQUIP. DIV.
LUCAS ELECTRICAL SERVICES, INC.
14820 Detroit Ave.
Cleveland 7, Ohio
COMMERCIAL FILTER CORPORATION
2 Main St.
Melrose 76, Massachusetts
CUNO ENGINEERING CORP.
64 S. Vine St.
Meriden, Conn.
FRAM CORPORATION
Providence 16, R. I.
INDIANA COMMERCIAL FILTER CORP.
Lebanon, Indiana
LUBER-FINER, INC.
2514 S. Grand Avenue
Los Angeles 7, California
WM. W. NUGENT & CO., INC.
3426 Cleveland St.
Skokie, Illinois
PUROLATOR PRODUCTS, INC.
970 New Brunswick Avenue
Rahway, New Jersey
WIX CORPORATION
1211 Ozark
Gastonia, N. Car.

Filters, Fuel Oil

AMERICAN BOSCH DIVISION
AMERICAN BOSCH ARMA CORP.
3664 Main Street
Springfield 7, Mass.
BRIGGS FILTRATION COMPANY
River Rd.
Washington 16, D. C.
C. A. V. FUEL INJECTION EQUIP. DIV.
LUCAS ELECTRICAL SERVICES, INC.
14820 Detroit Avenue
Cleveland 7, Ohio
COMMERCIAL FILTER CORP.
2 Main Street
Melrose 76, Massachusetts
CUNO ENGINEERING CORP.
64 S. Vine St.
Meriden, Conn.
DE LUXE PRODUCTS CORP.
1201 Michigan Blvd.
Racine, Wisconsin
FRAM CORP.
Providence 16, Rhode Island
HARTFORD MACHINE SCREW CO.
BOX 1440
Hartford 2, Conn.
THE HILLIARD CORP.
120 West 4th Street
Elmira, N. Y.
HOFFMAN-ALLEN CORP.
1400 E. Tampa
Springfield, Mo.
INDIANA COMMERCIAL FILTER CORP.
Lebanon, Indiana
LUBER-FINER, INC.
2514 South Grand Ave.
Los Angeles, California
WM. W. NUGENT & CO., INC.
3426 Cleveland St.
Skokie, Illinois
PUROLATOR PRODUCTS, INC.
970 New Brunswick Ave.
Rahway, N. J.
ROBERT BOSCH CORP.
40-25 Crescent St.
L. I. City, N. Y.
WIX CORPORATION
1211 Ozark
Gastonia, N. Car.

Filters, Gasoline

COMMERCIAL FILTER CORP.
2 Main Street
Melrose 76, Massachusetts
CUNO ENGINEERING CORP.
64 S. Vine St.
Meriden, Connecticut
FRAM CORP.
Providence 16, R. I.
HOFFMAN ALLEN CORP.
1400 E. Tampa
Springfield, Mo.
INDIANA COMMERCIAL FILTER CORP.
Lebanon, Indiana
LUBER-FINER, INC.
2514 S. Grand Avenue
Los Angeles 7, Calif.
WM. W. NUGENT & CO., INC.
3426 Cleveland St.
Skokie, Illinois
PUROLATOR PRODUCTS, INC.
970 New Brunswick Ave.
Rahway, New Jersey
WIX CORPORATION
1211 Ozark
Gastonia, N. Car.

Filters, Lubricating Oil

BRIGGS FILTRATION COMPANY
River Rd.
Washington 16, D. C.
COMMERCIAL FILTER CORP.
2 Main Street
Melrose 76, Mass.
CUNO ENGINEERING CORP.
64 S. Vine St.
Meriden, Conn.
DE LUXE PRODUCTS CORP.
1201 Michigan Blvd.
Racine, Wisconsin
ENGINE LIFE PRODUCTS
115 S. Granada
El Monte, Calif.
FRAM CORP.
Providence 16, Rhode Island
THE HILLIARD CORP.
120 West 4th Street
Elmira, N. Y.
HOFFMAN ALLEN CORP.
1400 E. Tampa
Springfield, Mo.
INDIANA COMMERCIAL FILTER CORP.
Lebanon, Indiana
LUBER-FINER, INC.
2514 South Grand Ave.
Los Angeles, California
WM. N. NUGENT & CO., INC.
3426 Cleveland St.
Skokie, Illinois
PUROLATOR PRODUCTS, INC.
970 New Brunswick Ave.
Rahway, N. J.
WINSLOW ENGINEERING CO.
4069-73 Hollis Street
Oakland 8, Calif.
WIX CORPORATION
1211 Ozark
Gastonia, N. Car.

Fire Extinguishers, Dry Chemical Type

ANSUL CHEMICAL COMPANY
1 Stanton Street
Marinette, Wisc.

Fire Extinguishers, Liquid Aerosol

SPRAY PRODUCTS CORP.
P. O. Box 844
Camden 1, N. J.

Fittings, Hose, Detachable

AEROQUIP CORP.
300 S. East Ave.
Jackson, Mich.
AEROQUIP CORP., WESTERN DIV.
3015 Winona Avenue
Burbank, Calif.
CORONET PARTS MFG. CO., INC.
883 Elton Street
Brooklyn 8, N. Y.

Flat Lapping Equipment

CRANE PACKING COMPANY
LAPMASTER DIVISION
6400 Oakton Street
Morton Grove, Ill.

Flexible Connections, Stainless Steel

See also headings under "Hose" and "Tubing"

THE AMERICAN BRASS CO.
AMERICAN METAL HOSE DIV.
698 S. Main St.
Waterbury 20, Conn.

Flexible Drives

See also under "Coupling" headings

BARBOUR STOCKWELL CO.
205 Broadway
Cambridge 39, Mass.

Flexible Exhaust Connections

See also headings under "Hose" and "Tubing"

THE AMERICAN BRASS CO.
AMERICAN METAL HOSE DIV.
698 S. Main St.
Waterbury 20, Conn.
KENT-MOORE ORG. INC.
28635 Mound Road
Warren, Michigan

Flexible Metal Hose

See also under "Hose" headings, "Tube" headings;

AMERICAN BRASS COMPANY
AMERICAN METAL HOSE DIVISION
698 South Main Street
Waterbury 20, Connecticut
FLEXONICS CORPORATION
1363 S. 3rd Ave.
Maywood, Ill.
KENT-MOORE ORG. INC.
28635 Mound Road
Warren, Michigan

Fluid Diesel Starting

See also "Diesel Starting Fluid";

SPRAY PRODUCTS CORP.
P. O. Box 584
Camden, N. J.

Forged Crankshafts

WYMAN-GORDON COMPANY
105 Madison St.
Worcester 1, Mass.

Forgings, Aluminum

ALUMINUM COMPANY OF AMERICA
1501 Alcoa Bldg.
Pittsburgh 19, Penna.
WYMAN-GORDON COMPANY
105 Madison Street
Worcester 1, Mass.

Forgings, Drop

See also "Connecting Rods, Forged", "Crankshafts, Forged";

THE PARK DROP FORGE COMPANY
777 East 79th Street
Cleveland 3, Ohio

WYMAN-GORDON COMPANY
105 Madison Street
Worcester 1, Mass.

Forgings, Iron & Steel

See also "Connecting Rods, Forged", Crankshafts, Forged";

ALCO PRODUCTS, INC.
30 Church St.
New York 8, N. Y.

ELLWOOD CITY FORGE COMPANY
10th Street
Ellwood City, Pa.

ERIE FORGE AND STEEL CORP.
1341 W. 16th Street
Erie, Pa.

WYMAN-GORDON COMPANY
105 Madison Street
Worcester 1, Mass.

Forgings, Steel

ERIE FORGE & STEEL CORP.
1341 West 16th St.
Erie, Penn.

WYMAN-GORDAN COMPANY
105 Madison Street
Worcester 1, Mass.

Friction Snubbers

HOUDAILLE INDUSTRIES, INC.
BUFFALO HYDRAULICS DIV.
537 E. Delavan Ave.
Buffalo 11, N. Y.

Fuel Deodorants

RHODIA, INC.
60 East 56th St.
New York 22, N. Y.

Fuel Injection Systems, Repair & Service

See also under "Injection Systems, Fuel", "Injection Systems, Service";

A & D DIESEL SERVICE, INC.
145 21st Street
Brooklyn 32, N. Y.

DIESEL FUEL INJECTION SERVICE, INC.
9331 South Broadway
St. Louis 23, Missouri

HANCOCK DIESEL SERVICE CO.
300 Walnut Street
Findlay, Ohio

INTERSTATE DIESEL SERVICE, INC.
2093 East 19 St.
Cleveland 15, Ohio

MC KINLEY CORP.
2196 Palou Ave.
San Francisco 24, Calif.

UNEX PRODUCTS CORP.
1841 Broadway
New York 23, N. Y.

Fuel Oil Additives

See also "Conditioners"

E. I. DU PONT DE NEMOURS & CO., INC.
PETROLEUM CHEMICAL DIV.
Wilmington 98, Del.

LUBAID COMPANY
3270 S. Third St.
Milwaukee 7, Wisc.

R. S. NORRIS & ASSOCIATES
26 Valley Road
Larchmont, N. Y.

RHODIA, INC.
60 East 56th St.
New York 22, N. Y.

Fuel Oil, Diesel

See also "Oils, Diesel Fuels", Diesel Fuel Oils", "Motor Fuels";

CITIES SERVICE OIL CO.
60 Wall Tower
New York 5, N. Y.

STANDARD OIL CO. (INDIANA)
910 South Michigan Ave.
Chicago 80, Illinois

Fuel Oil Heaters, Diesel

See also under "Heater" headings;

DAVIS ENGINEERING CORP.
30 Rockefeller Plaza
New York 20, N. Y.

THE WHITLOCK MFG. CO.
West Hartford 10, Conn.

Fuel Oil Tar and Carbon Dispersing Agent

R. S. NORRIS & ASSOCIATES
26 Valley Rd.
Larchmont, N. Y.

Fuel Oil Treatment, Diesel

CENTRICO, INC.
75 West Forest Ave.
Englewood, N. J.

LUBAID COMPANY
3270 S. Third St.
Milwaukee 7, Wisc.

R. S. NORRIS & ASSOCIATES
26 Valley Road
Larchmont, N. Y.

RHODIA, INC.
60 East 56th St.
New York 22, N. Y.

Gages, Air Pressure

KENT-MOORE ORG. INC.
28635 Mound Road
Warren, Michigan

ROCHESTER MFG. CO., INC.
Rockwood St.
Rochester 10, New York

Gages, Draft, Portable Indicating

BACHARACH INDUSTRIAL INSTRUMENT CO.
200 N. Braddock Ave.
Pittsburgh 8, Penn.

Gages, Fuel

LIQUIDOMETER CORP.
41-03 36 St.
Long Island City 1, N. Y.

ROCHESTER MFG. CO., INC.
Rockwood St.
Rochester 10, New York

Gages, Liquid Level

HARTFORD MACHINE SCREW CO.
Box 1440
Hartford 2, Conn.

LIQUIDOMETER CORP.
41-03 36th St.
Long Island City 1, N. Y.

ROCHESTER MFG. CO., INC.
Rockwood St.
Rochester 10, New York

Gages, Oil Pressure

ROCHESTER MFG. CO., INC.
Rockwood St.
Rochester 10, New York

Gages, Tank Contents

LIQUIDOMETER CORP.
41-03 36th St.
Long Island City 1, N. Y.

ROCHESTER MFG. CO., INC.
Rockwood St.
Rochester 10, New York

Gages, Temperature

See also, "Thermometers".

ROCHESTER MFG. CO., INC.
Rockwood St.
Rochester 10, New York

Gages, Vacuum

KENT-MOORE ORG. INC.
28635 Mound Road
Warren, Michigan

ROCHESTER MFG. CO., INC.
Rockwood St.
Rochester 10, N. Y.

Gaskets

THE ANCHOR PACKING CO.
Philadelphia, Pa.

THE DARCOID CO., INC.
145-6th Ave.
New York 13, N. Y.

THE FITZGERALD MFG. CO.
Torrington, Conn.

MC CORD CORPORATION
Riopelle at E. Grand Blvd.
Detroit 11, Michigan

VELLUMOID COMPANY
Worcester, Mass.

VICTOR MFG. & GASKET CO.
P. O. Box 1333
Chicago 90, Ill.

WISCONSIN GASKET & MFG. CO.
Granville, Wisconsin

Gaskets, Asbestos

See also, "Asbestos Sheet".

THE ANCHOR PACKING CO.
Philadelphia, Pa.

VICTOR MFG. & GASKET CO.
P. O. Box 1333
Chicago 90, Ill.

WISCONSIN GASKET & MFG. CO.
Granville, Wisconsin

Gaskets, Cork

THE ANCHOR PACKING CO.
Philadelphia, Pa.

THE FITZGERALD MFG. CO.
Torrington, Connecticut

VICTOR MFG. & GASKET CO.
P. O. Box 1333
Chicago 90, Ill.

WISCONSIN GASKET & MFG. CO.
Granville, Wisconsin

Gaskets, Fibrous

THE ANCHOR PACKING CO.
Philadelphia, Pa.

VELLUMOID COMPANY
Worcester, Mass.

VICTOR MFG. & GASKET CO.
P. O. Box 1333
Chicago 90, Ill.

WISCONSIN GASKET & MFG. CO.
Granville, Wisconsin

Gaskets, Metallic

THE ANCHOR PACKING CO.
Philadelphia, Pa.

THE FITZGERALD MFG. CO.
Torrington, Conn.

MC CORD CORPORATION
Riopelle at E. Grand Blvd.
Detroit 11, Michigan

VICTOR MFG. & GASKET CO.
P. O. Box 1333
Chicago 90, Ill.

Gaskets, Oil and Water

THE ANCHOR PACKING CO.
Philadelphia, Pa.

THE FITZGERALD MFG. CO.
Torrington, Connecticut

McCORD CORPORATION
Riopelle at E. Grand Blvd.
Detroit 11, Mich.

VELLUMOID COMPANY
Worcester, Mass.

VICTOR MFG. & GASKET CO.
P. O. Box 1333
Chicago 90, Ill.

WISCONSIN GASKET & MFG. CO.
Granville, Wisconsin

Gear Forgings

THE PARK DROP FORGE CO.
777 East 79th St.
Cleveland 3, Ohio

Geared Transmissions, Auxiliary

BRAD FOOTE GEAR WORKS, INC.
1315 S. Cicero Ave.
Cicero 50, Ill.

Geared Transmissions, Unit

BRAD FOOTE GEAR WORKS, INC.
1315 S. Cicero Ave.
Cicero 50, Ill.

Gears

See also "Drives, Gear";

BRAD FOOTE GEAR WORKS, INC.
1315 S. Cicero Ave.
Cicero 50, Ill.
BROWN BOVERI CORP.
19 Rector Street
New York 6, N. Y.

Gears, Aircraft Quality

BRAD FOOTE GEAR WORKS, INC.
1315 S. Cicero Ave.
Cicero 50, Ill.

Gears, Bevel

BRAD FOOTE GEAR WORKS, INC.
1315 S. Cicero Ave.
Cicero 50, Ill.

Gears, Cut

BRAD FOOTE GEAR WORKS, INC.
1315 S. Cicero Ave.
Cicero 50, Ill.

Gears, Heat Treated

BRAD FOOTE GEAR WORKS, INC.
1315 S. Cicero Ave.
Cicero 50, Ill.

Gears, Helical

BRAD FOOTE GEAR WORKS, INC.
1315 S. Cicero Ave.
Cicero 50, Ill.

Gears, Herringbone

BRAD FOOTE GEAR WORKS, INC.
1315 S. Cicero Ave.
Cicero 50, Ill.

Gears, Internal

BRAD FOOTE GEAR WORKS, INC.
1315 S. Cicero Ave.
Cicero 50, Ill.

Gears, Non-Metallic

BRAD FOOTE GEAR WORKS, INC.
1315 S. Cicero Ave.
Cicero 50, Ill.

Gears, Planetary

BRAD FOOTE GEAR WORKS, INC.
1315 S. Cicero Ave.
Cicero 50, Ill.

Gears, Reduction

BRAD FOOTE GEAR WORKS, INC.
1315 S. Cicero Ave.
Cicero 50, Ill.
BROWN BOVERI CORP.
19 Rector St.
New York 6, N. Y.
DE LAVAL STEAM TURBINE CO.
Trenton 2, New Jersey
LOVEJOY FLEXIBLE COUPLING CO.
4866 West Lake Street
Chicago 44, Ill.
ROCKFORD CLUTCH DIVISION
BORG-WARNER CORP.
1301 18th Avenue
Rockford, Illinois
THE SNOW-NABSTEDT GEAR CORP.
251 Welton St.
Hamden, Conn.
TWIN DISC CLUTCH CO.
1328 Racine St.
Racine, Wisconsin
WORTHINGTON CORPORATION
Worthington Ave.
Harrison, N. J.

Gears, Speed Increaser

BRAD FOOTE GEAR WORKS, INC.
1315 S. Cicero Ave.
Cicero 50, Ill.
BROWN BOVERI CORP.
19 Rector St.
New York 6, N. Y.
LOVEJOY FLEXIBLE COUPLING CO.
4866 West Lake St.
Chicago 44, Ill.
THE SNOW-NABSTEDT GEAR CORP.
251 Welton St.
Hamden, Conn.

Gears, Speed Reduction

BRAD FOOTE GEAR WORKS, INC.
1315 S. Cicero Ave.
Cicero 50, Ill.

Gears, Spiral

BRAD FOOTE GEAR WORKS, INC.
1315 S. Cicero Ave.
Cicero 50, Ill.

Gears, Spiral Bevel

BRAD FOOTE GEAR WORKS, INC.
1315 S. Cicero Ave.
Cicero 50, Ill.

Gears, Spur

BRAD FOOTE GEAR WORKS, INC.
1315 S. Cicero Ave.
Cicero 50, Ill.

Gears, Worm

BRAD FOOTE GEAR WORKS, INC.
1315 S. Cicero Ave.
Cicero 50, Ill.

Generating Sets, Electric

Select from "Auxiliary Generator" listings;

ALLIS-CHALMERS
ENGINE-MATERIALS HANDLING DIV.
1135 South 70th Street
Milwaukee 1, Wisconsin
AMERICAN MARC INC.
1601 W. Florence Ave.
Inglewood, Calif.
BROWN BOVERI CORP.
19 Rector Street
New York 6, New York
CONSOLIDATED DIESEL ELECTRIC
CORP. POWER EQUIPMENT DIVISION
880 Canal Street
Stamford, Conn.
NATIONAL METAL & STEEL CORP.
1251 New Dock St.
Terminal Island, Calif.
D. W. ONAN & SONS, INC.
2515 University Ave., S.E.
Minneapolis 14, Minnesota
ORENDA INDUSTRIAL, INC.
34-14 58th Street
Woodside 77, N. Y.

Generators, A. C.

See also "Alternators";

BROWN BOVERI CORP.
19 Rector Street
New York 6, N. Y.
COLUMBIA ELECTRIC MFG. CO.
4537 Hamilton Ave.
Cleveland 14, Ohio
ELECTRIC MACHINERY MFG. CO.
800 Central Avenue
Minneapolis 13, Minn.
ELECTROMOTIVE DIVISION
GENERAL MOTORS CORP.
La Grange, Illinois
ELLIOTT COMPANY
Jeannette, Pennsylvania
IDEAL ELECTRIC & MFG. CO.
Mansfield, Ohio
KATO ENGINEERING CO.
1443 First Avenue
Mankato, Minnesota
KURZ & ROOT CO., INC.
Appleton, Wisc.

Generators, Charging

AMERICAN BOSCH DIVISION
AMERICAN BOSCH ARMA CORP.
3664 Main Street
Springfield, Massachusetts

Generators, Charging, Direct Current Rectified A. C.

DELCO-REMY DIVISION
GENERAL MOTORS CORPORATION
2401 Columbus Avenue
Anderson, Indiana

Generators, D. C.

COLUMBIA ELECTRIC MFG. CO.
4537 Hamilton Ave.
Cleveland 14, Ohio
THE ELECTRIC AUTO-LITE CO.
Champlain St.
Toledo, Ohio
ELECTRO-MOTIVE DIVISION
GENERAL MOTORS CORP.
La Grange, Illinois
THE ELLIOTT COMPANY
Jeannette, Pennsylvania
IDEAL ELECTRIC & MFG. CO.
Mansfield, Ohio
KATO ENGINEERING CO.
1443 First Avenue
Mankato, Minnesota
KURZ & ROOT CO., INC.
Appleton, Wisc.

Generators, Engine Driven

ALLIS-CHALMERS MFG. CO.
ENGINE MATERIALS HANDLING DIV.
1135 S. 70th Street
Milwaukee 1, Wis.
AMERICAN MARC INC.
1601 West Florence Ave.
Inglewood, Calif.
CONSOLIDATED DIESEL ELECTRIC
CORP. POWER EQUIPMENT DIVISION
880 Canal Street
Stamford, Connecticut
ELECTRIC MACHINERY MFG. CO.
800 Central Avenue
Minneapolis 13, Minn.
ELLIOTT COMPANY
Jeannette, Pa.
ENTERPRISE ENGINE & MACHINERY CO.
18th & Florida Streets
San Francisco 10, Calif.
IDEAL ELECTRIC & MFG. CO.
Mansfield, Ohio
LISTER-BLACKSTONE, INC.
42-32 21st St.
Long Island City 1, N. Y.
ORENDA INDUSTRIAL, INC.
34-14 58th Street
Woodside 77, N. Y.
STERLING ENGINE CO., INC.
Menominee, Michigan
STEWART & STEVENSON SERVICES, INC.
4516 Harrisburg
Houston, Texas
WAUKESHA MOTOR CO.
W. St. Paul Ave.
Waukesha, Wis.

G. M. Fuel Injector Repair

INTERSTATE DIESEL SERVICE, INC.
2093 East 19th Street
Cleveland 15, Ohio

Governors, Centrifugal

FARRIS PICKERING GOVERNOR CO.
556 Commercial Avenue
Palisades Park, N. J.

Governors, Electric

CURTISS-WRIGHT CORP.,
MARQUETTE DIVISION
1145 Galewood Drive
Cleveland 10, Ohio

Governors, Hydraulic

A & D DIESEL SERVICE, INC.
145 21st St.
Brooklyn 32, N. Y.

CURTISS-WRIGHT CORP.
MARQUETTE DIV.
1145 Galewood Drive
Cleveland 10, Ohio

FARRIS PICKERING GOVERNOR CO.
556 Commercial Avenue
Palisades Park, N. J.

WOODWARD GOVERNOR CO.
5001 N. Second St.
Rockford, Illinois

Governors, Hydraulic, Sales & Service

Mc KINLEY CORP.
2196 Palou Ave.
San Francisco 24, Calif.

Governors, Load-Sensing

WOODWARD GOVERNOR CO.
5001 N. Second St.
Rockford, Ill.

Governors, Overspeed

A & D DIESEL SERVICE, INC.
145 21st St.
Brooklyn 32, N. Y.

CURTISS WRIGHT CORP.
MARQUETTE DIVISION
1145 Galewood Drive
Cleveland 10, Ohio

FARRIS PICKERING GOVERNOR CO.
556 Commercial Avenue
Palisades Park, N. J.

SYNCHRO-START PRODUCTS
8151 N. Ridgeway Ave.
Skokie, Ill.

WOODWARD GOVERNOR CO.
5001 N. 2nd St., Rockford, Ill.

Governors, Overspeed, Engine Shut-Off

CURTISS WRIGHT CORP.
MARQUETTE DIVISION
1145 Galewood Dr.
Cleveland 10, Ohio

FARRIS-PICKERING GOVERNOR CO.
556 Commercial Avenue
Palisades Park, N. J.

SYNCHRO-START PRODUCTS, INC.
8151 N. Ridgeway Ave.
Skokie, Ill.

WOODWARD GOVERNOR CO.
5001 N. 2nd St., Rockford, Ill.

Governors, Repair

DIESEL FUEL INJECTION SERVICE, INC.
9331 S. Broadway
St. Louis 23, Missouri

Governors, Underspeed

SYNCHRO-START PRODUCTS
8151 N. Ridgeway Ave.
Skokie, Ill.

Greases

See also "Lubricants"; "Automotive Greases".

THE CALIFORNIA OIL CO.
1200 State St.
Perth Amboy, N. J.

CITIES SERVICE OIL CO.
60 Wall Tower
New York, N. Y.

NATIONAL REFINING CO.
P. O. Box 6479
Cleveland 1, Ohio

SHELL OIL CO.
50 W. 50th St.
New York 20, N. Y.

THE TEXAS COMPANY
135 E. 42d St.
New York 17, N. Y.

Grinders

See also "Crankshaft Grinders".

ALBERTSON & CO., INC.
Sioux City, Iowa

MARINE PUMPS, INC.,
SPIRAL & UNITEST DIV.
226 N. Marine Avenue
Wilmington, Calif.

TOBIN-ARP. MFG. CO.
6400 Penn Ave. S.
Minneapolis, Minn.

Grinders, Cylinder Head

PETERSON MACHINE TOOL, INC.
6200 Merriam Drive
Merriam, Kansas

Hardened & Ground Parts

ALLYN MFG. CO.
1758 W. Wellington Ave.
Chicago 13, Ill.

BURGESS-NORTON MFG. CO.
737 Peyton St.
Geneva, Ill.

HARTFORD MACHINE SCREW CO.
Box 1440
Hartford 2, Conn.

Heaters

See also "Fuel Oil Heaters, Diesel".

ALCO PRODUCTS, INC.
30 Church St.
New York 8, N. Y.

AMERICAN AIR FILTER CO., INC.
215 Central Ave.
Louisville 8, Ky.

DAVIS ENGINEERING CORP.
30 Rockefeller Plaza
New York 20, N. Y.

KYSOR HEATING CO.
1100 W. Wright St.
Cadillac, Mich.

THE WHITLOCK MFG. CO.
West Hartford 10, Conn.

Heaters, Cab & Space

YOUNG RADIATOR CO.
709 S. Marquette St.
Racine, Wisc.

Heaters, Coolant, Electric

KIM HOTSTART MFG. CO.
917 W. Broadway
Spokane 1, Wash.

Heaters, Engine, Coolant Immersion

TECH PRODUCTS, INC.
615 Pennsylvania Ave.
Elizabeth, N. J.

Heaters, Feed Water

THE WHITLOCK MFG. CO.
West Hartford 10, Conn.

Heat Exchangers, Air Cooled

See also under "Cooler" headings

AEROFIN CORP.
101 Greenway Ave.
Syracuse 3, N. Y.

ALCO PRODUCTS, INC.
30 Church St.
New York 8, N. Y.

DAVIS ENGINEERING CORP.
30 Rockefeller Plaza
New York 20, N. Y.

THE ROME-TURNEY RADIATOR CO.
Rome, N. Y.

YOUNG RADIATOR CO.
709 S. Marquette St.
Racine, Wisc.

Heat Exchangers, Industrial

See also under "Cooler" headings.

AEROFIN CORP.
101 Greenway Ave.
Syracuse 3, N. Y.

ALCO PRODUCTS, INC.
30 Church St.
New York 8, N. Y.

DAVIS ENGINEERING CORP.
30 Rockefeller Plaza
New York 20, N. Y.

THE ROME-TURNEY RADIATOR CO.
Rome, N. Y.

THE WHITLOCK MFG. CO.
West Hartford 10, Conn.

YOUNG RADIATOR COMPANY
709 S. Marquette St.
Racine, Wisconsin

Heat Exchangers, Oil and Water

See also under "Cooler" headings.

ALCO PRODUCTS, INC.
30 Church St.
New York 8, N. Y.

DAVIS ENGINEERING CORP.
30 Rockefeller Plaza
New York 20, N. Y.

HARRISON RADIATOR DIV., GM
Lockport, N. Y.

PERFEX CORPORATION
500 W. Oklahoma Ave.
Milwaukee 7, Wisc.

THE SIMS CO., INC.
P. O. Box 1096
Erie, Pa.

THE WHITLOCK MFG. CO.
West Hartford 10, Conn.

YOUNG RADIATOR COMPANY
709 S. Marquette St.
Racine, Wisconsin

Honeycomb Filter Tubes

COMMERCIAL FILTERS CORP.
2 Main St.
Melrose 76, Mass.

Honing Tools

C. ALLEN FULMER CO.
First National Bank Bldg.
Cincinnati 2, Ohio

HALL-TOLEDO, INC.
2931 South Ave.
Toledo 9, Ohio

MICROMATIC HONE CORP.
8100 Schoolcraft Ave.
Detroit 38, Mich.

Hoses, Metal, for Steam, Oil, Air

See also under "Flexible . . . ." headings, "Tube" headings.

AEROQUIP CORP.
300 S. East Ave.
Jackson, Mich.

AEROQUIP CORP.
WESTERN DIVISION
3015 Winona Avenue
Burbank, Calif.

THE AMERICAN BRASS CO.
AMERICAN METAL HOSE DIVISION
698 S. Main Street
Waterbury 20, Conn.

THE ANCHOR PACKING CO.
Philadelphia, Pa.
FLEXONICS CORP.
1363 S. 3rd Ave.
Maywood, Ill.

Hoses, Flexible Assemblies

See also under "Flexible" headings, "Tube" headings.

AEROQUIP CORPORATION
300 S. East Ave.
Jackson, Mich.
AEROQUIP CORP.,
WESTERN DIVISION
3015 Winona Avenue
Burbank, Calif.
THE AMERICAN BRASS COMPANY
AMERICAN METAL HOSE DIVISION
698 S. Main St.
Waterbury 20, Connecticut
FLEXONICS CORP.
1363 S. 3rd Ave.
Maywood, Ill.

Hoses, Flexible Metallic

See also under "Flexible" headings, "Tube" headings.

THE AMERICAN BRASS CO.
AMERICAN METAL HOSE DIVISION
698 S. Main Street
Waterbury 20, Conn.

Hoses, Flexible Wire Braid

See also under "Flexible" headings, "Tube" headings.

AEROQUIP CORPORATION
300 South East Ave.
Jackson, Mich.
AEROQUIP CORP.,
WESTERN DIVISION
3015 Winona Avenue
Burbank, Calif.
THE AMERICAN BRASS CO.
AMERICAN METAL HOSE DIVISION
698 South Main Street
Waterbury 20, Connecticut

Hoses, Metal, for Steam, Oil, Air

See also under "Flexible" headings, "Tube" headings.

THE AMERICAN BRASS CO.
AMERICAN METAL HOSE DIV.
698 S. Main St.
Waterbury, Conn.

Hydraulic Fluids

CITIES SERVICE OIL CO.
60 Wall Tower
New York 5, N. Y.
SHELL OIL CO.
50 W. 50th St.
New York 17, N. Y.
THE TEXAS CO.
135 E. 42nd St.
New York 17, N. Y.

Hydraulic Valve Lifters

EATON MANUFACTURING CO.
VALVE DIV.
9771 French Rd.
Detroit 13, Mich.

Ignition Systems, Gas Engine

See also under "Magneto" headings, "Compression Testers, Diesel Engines"

AMERICAN BOSCH DIVISION
AMERICAN BOSCH ARMA CORP.
3664 Main Street
Springfield 7, Mass.
DELCO-REMY DIVISION
GENERAL MOTORS CORPORATION
2401 Columbus Avenue
Anderson, Indiana
SCINTILLA DIVISION
BENDIX AVIATION CORPORATION
Sidney, New York

Ignition Transformers

AMERICAN BOSCH DIVISION
AMERICAN BOSCH ARMA CORP.
3664 Main Street
Springfield 7, Mass.
SCINTILLA DIVISION
BENDIX AVIATION CORP.
Sidney, New York

Impact Wrenches

ALBERTSON & CO., INC.
Sioux City, Iowa
SNAP-ON-TOOLS CORP.
8064 28th Ave.
Kenosha, Wisc.

Indicators, Carbon Dioxide Portable

BACHARACH INDUSTRIAL
INSTRUMENT CO.
200 N. Braddock Ave.
Pittsburgh 8, Pa.

Indicators, Diesel Engine

See also "Diesel Engine Indicators P-T".

BACHARACH INDUSTRIAL
INSTRUMENT CO.
200 N. Braddock Ave.
Pittsburgh 8, Pa.
KENT-MOORE ORGANIZATION, INC.
28635 Mound Rd.
Warren, Mich.
KIENE DIESEL ACCESSORIES, INC.
10352 Pacific Ave.
Franklin Park, Illinois
KISTLER INSTRUMENT CORP.
15 Webster St.
North Tonawanda, N. Y.

Indicators, Maximum Pressure

See also "Diesel Engine Indicators P-T".

BACHARACH INDUSTRIAL
INSTRUMENT CO.
200 N. Braddock Ave.
Pittsburgh 8, Pa.
KENT-MOORE ORGANIZATION, INC.
28635 Mound Rd.
Warren, Mich.
KISTLER INSTRUMENT CORP.
15 Webster St.
North Tonawanda, N. Y.

Indicators, Oxygen, Portable

BACHARACH INDUSTRIAL
INSTRUMENT CO.
200 N. Braddock Ave.
Pittsburgh 8, Pa.

Indicators, Pressure-Time, Diesel Engine

BACHARACH INDUSTRIAL
INSTRUMENT CO.
200 N. Braddock Ave.
Pittsburgh 8, Pa.
KISTLER INSTRUMENT CORP.
15 Webster St.
North Tonawanda, N. Y.

Indicators, Sight Flow

WM. W. NUGENT & CO., INC.
3426 Cleveland St.
Skokie, Ill.

Industrial Oils

See also headings under "Lubricants" and "Greases".

STANDARD OIL COMPANY (INDIANA)
910 S. Michigan Avenue
Chicago, Ill.

Industrial Wheel Tractors

INTERNATIONAL HARVESTER CO.
180 N. Michigan Ave.
Chicago 1, Ill.

Injection Systems, Fuel

See also "Nozzles, Fuel Injection", "Fuel Injection Systems Sales & Service", "Unit Injectors, Fuel Oil".

AMERICAN BOSCH DIVISION
AMERICAN BOSCH ARMA CORP.
3664 Main St.
Springfield 7, Mass.
C.A.V. FUEL INJECTION EQUIPMENT
DIVISION OF LUCAS ELECTRICAL
SERVICES, INC.
14820 Detroit Avenue
Cleveland 7, Ohio
DIESEL FUEL INJECTION SERVICE, INC.
9331 S. Broadway
St. Louis 23, Missouri
DIESEL PARTS CO. OF CALIFORNIA
1800 E. 12th St.
Oakland 6, Calif.
HANCOCK DIESEL SERVICE CO.
300 Walnut St.
Findlay, Ohio
HARTFORD MACHINE SCREW CO.
Box 1440
Hartford 2, Conn.
MCKINLEY CORP.
2196 Palou Ave.
San Francisco, Calif.
ROBERT BOSCH CORP.
40-25 Crescent St.
Long Island City, N. Y.
SCINTILLA DIVISION
BENDIX AVIATION CORP.
Sherman Ave.
Sidney, N. Y.
UNEX PRODUCTS CORP.
1841 Broadway
New York 23, N. Y.

Injection Systems, Service

See also "Nozzles, Fuel Injection", "Fuel Injection Systems Sales & Service", "Unit Injectors, Fuel Oil".

A & D DIESEL SERVICE, INC.
145 21st St.
Brooklyn 32, N. Y.
DIESEL FUEL INJECTION SERVICE, INC.
9331 S. Broadway
St. Louis 23, Missouri
HANCOCK DIESEL SERVICE CO.
300 Walnut St.
Findlay, Ohio
INTERSTATE DIESEL SERVICE, INC.
2093 East 19 St.
Cleveland 15, Ohio
UNEX PRODUCTS CORP.
1841 Broadway
New York 23, N. Y.

Injector Test Stand

Select from "Diesel Test Equipment" listings

BACHARACH INDUSTRIAL
INSTRUMENT CO.
200 N. Braddock Ave.
Pittsburgh 8, Pa.
DIESEL INJECTION SALES &
SERVICE, INC.
808 Union St.
Norfolk, Va.
MARINE PUMPS, INC.
SPIRAL & UNITEST DIVISION
226 N. Marine Ave.
Wilmington, Calif.
KENT-MOORE ORGANIZATION, INC.
28635 Mound Rd.
Warren, Mich.

Inspection, for Cracks

MAGNAFLUX CORP.
7300 W. Lawrence Ave.
Chicago 31, Ill.

Intercoolers, Air Compressor

THE ROME-TURNEY RADIATOR CO.
Rome, N. Y.

Iron Plating

See also "Plating".

VAN DER HORST CORP. OF AMERICA
1313 East State Street
Olean, New York

VAN DER HORST CORP. OF AMERICA
Grove & Delph St.
Tarrell, Texas
VAN DER HORST CORP. OF AMERICA
2610 S. Shields Ave.
Chicago, Ill.

Joints, Expansion

BADGER MANUFACTURING CO.
230 Bent St.
Cambridge, Mass.

Lapping Equipment

CRANE PACKING CO.,
LAPMASTER DIVISION
6400 Oakton St.
Morton Grove, Ill.
MARINE PUMPS, INC.
SPIRAL & UNITEST DIVISION
226 N. Marine Ave.
Wilmington, Calif.

Line Boring Machine

TOBIN-ARP MFG. CO.
6400 Penn Ave. So.
Minneapolis, Minn.

Liner Replating

METAL FINISHERS, INC.
1725 E. 27th St.
Cleveland 14, Ohio

Lock Nuts

COLUMBIA NUT & BOLT CO., INC.
945 Main Street
Bridgeport 3, Connecticut

Locomotives, Diesel

See also "Diesel Locomotive, Electrical & Mechanical."

PLYMOUTH LOCOMOTIVE WORKS,
DIV. OF THE FATE-ROOT-HEATH CO.
Plymouth, Ohio

Locomotives, Diesel-Electric

See also "Diesel Locomotive, Electrical & Mechanical."

ALCO PRODUCTS, INC.
30 Church St.
New York 8, N. Y.
BROWN-BOVERI CORP.
19 Rector St.
New York 6, N. Y.
ELECTRO-MOTIVE DIVISION
GENERAL MOTORS CORP.
La Grange, Ill.
PLYMOUTH LOCOMOTIVE WORKS,
DIV. OF THE FATE-ROOT-HEATH CO.
Plymouth, Ohio

Locomotives, Diesel-Hydraulic

See also "Diesel Locomotive, Electrical & Mechanical."

MAK MASCHINENBAU KIEL
AKTIENGESELLSCHAFT
Kiel - Friedrichsort, Germany (Western)
PLYMOUTH LOCOMOTIVE WORKS,
DIV. OF THE FATE-ROOT-HEATH CO.
Plymouth, Ohio

Locomotives, Diesel-Mechanical

See also "Diesel Locomotive, Electrical & Mechanical."

PLYMOUTH LOCOMOTIVE WORKS,
DIV. OF THE FATE-ROOT-HEATH CO.
Plymouth, Ohio

Locomotives, Diesel, Mine

See also "Diesel Locomotive, Electrical & Mechanical."

PLYMOUTH LOCOMOTIVE WORKS,
DIV. OF THE FATE-ROOT-HEATH CO.
Plymouth, Ohio

Lubricants

See also under "Greases", "Automotive Greases", "Lubricating Oils"

THE CALIFORNIA OIL CO.
1200 State St.
Perth Amboy, N. J.
SHELL OIL COMPANY
50 W. 50th Street
New York 20, N. Y.
STANDARD OIL CO. OF CALIF.
WESTERN OPERATIONS, INC.
225 Bush Street
San Francisco 20, Calif.
STANDARD OIL COMPANY (INDIANA)
910 S. Michigan Ave.
Chicago, Ill.

Lubricating Oils

See also "Lubricants".

THE CALIFORNIA OIL CO.
1200 State St.
Perth Amboy, N. J.
CITIES SERVICE OIL COMPANY
60 Wall Tower
New York, New York
NATIONAL REFINING COMPANY
P. O. Box 6479
Cleveland 1, Ohio
SHELL OIL COMPANY
50 West 50th St.
New York 20, N. Y.
STANDARD OIL CO. OF CALIF.
WESTERN OPERATIONS, INC.
225 Bush St.
San Francisco 20, Calif.
STANDARD OIL CO. (INDIANA)
910 South Michigan Ave.
Chicago, Illinois

Lubricating Oil Test Kit

LENGOR, INC.
Towns-Worth Bldg.
Annapolis, Md.

Lubricators, Felt Wick

WM. W. NUGENT & CO., INC.
3426 Cleveland St.
Skokie, Ill.

Lubricators, Mechanical

MANZEL DIV.
HOUDAILLE INDUSTRIES, INC.
315 Babcock St.
Buffalo 10, N. Y.
MC CORD CORP.
Riopelle at E. Grand Blvd.
Detroit 11, Mich.

Machine Shop Products

BURGESS-NORTON MFG. CO.
737 Peyton St.
Geneva, Ill.

Machine Tools

BALDWIN-LIMA-HAMILTON CORP.
545 N. 3rd St.
Hamilton, Ohio
VAN NORMAN AUTOMOTIVE
EQUIP. CO.
3640 Main St.
Springfield 7, Mass.

Machine Tools, Precision

VAN NORMAN AUTOMOTIVE EQUIP.
CO.
3640 Main St.
Springfield 7, Mass.

Machine Tools, Precision Honing

C. ALLEN FULMER CO.
First National Bank Bldg.
Cincinnati 2, Ohio
MICROMATIC HONE CORP.
8100 Schoolcraft Ave.
Detroit 38, Mich.
VAN NORMAN AUTOMOTIVE EQUIP.
CO.
3640 Main St.
Springfield 7, Mass.

Machines, Special for Engine Rebuilding Service

See also "Tools Diesel Engine Service"

TOBIN-ARP MANUFACTURING CO.
6400 Penn Ave., South
Minneapolis, Minn.

Magnetic Inspection Equipment

PETERSON MACHINE TOOL, INC.
6200 Merriam Drive
Merriam, Kansas

Magneto Service

FLORIDA DIESEL & ELECTRIC CO.
1930 N. Miami Ave.
Miami 36, Florida

Magnetos, High Tension

See also "Injection Systems, Gas Engines".

AMERICAN BOSCH DIVISION
AMERICAN BOSCH ARMA CORP.
3664 Main Street
Springfield, Mass.
SCINTILLA DIVISION
BENDIX AVIATION CORPORATION
Sherman Ave.
Sidney, New York

Magnetos, Low Tension

See also "Ignition Systems, Gas Engines"

AMERICAN BOSCH DIVISION
AMERICAN BOSCH ARMA CORP.
3664 Main Street
Springfield, Mass.
SCINTILLA DIVISION
BENDIX AVIATION CORPORATION
Sherman Ave.
Sidney, New York

Manometers

BACHARACH INDUSTRIAL
INSTRUMENT CO.
200 N. Braddock Ave.
Pittsburgh 8, Pa.

Marine Diesel, Front End Gear Driven Accessories

See also "Drives, Gear", headings under "Gears"

AMERICAN M-A-N CORP.
149 Broadway
New York 6, N. Y.
M.A.K. MASCHINENBAU KIEL A.G.
Kiel-Friedrichsort
Kiel, West Germany
TWIN DISC CLUTCH CO.
1328 Racine St.
Racine, Wisc.

Marine Diesel Starting Fluid

SPRAY PRODUCTS CORP.
P. O. Box 584
Camden, N. J.

Marine Reduction Gears

See also "Drives, Gear", headings under "Gears"

BRAD FOOTE GEAR WORKS, INC.
1315 S. Cicero Ave.
Cicero 50, Ill.
BROWN-BOVERI CORP.
19 Rector St.
New York 6, N. Y.
THE SNOW-NABSTEDT GEAR CORP.
251 Welton St.
Hamden, Conn.
TWIN DISC CLUTCH CO.
1328 Racine St.
Racine, Wisc.

Marine Reverse & Reduction Gears

See also "Drives, Gear", headings under "Gears"

BRAD FOOTE GEAR WORKS, INC.
1315 S. Cicero Ave.
Cicero 50, Ill.
BROWN-BOVERI CORP.
19 Rector St.
New York 6, N. Y.
DELAVAL STEAM TURBINE CO.
Trenton 2, N. J.

THE SNOW-NABSTEDT GEAR CORP.
251 Welton St.
Hamden, Conn.
TWIN DISC CLUTCH CO.
1328 Racine St.
Racine, Wisc.

Mechanical, Governors

A. & D. DIESEL SERVICE, INC.
145 21st Street
Brooklyn 32, N. Y.

Metals, High Temperature & Corrosion Resistant

INTERNATIONAL NICKEL CO., INC.
67 Wall St.
New York 5, N. Y.

Meters, Elapsed Time

SIMPSON ELECTRIC CO.
5200 W. Kinzie St.
Chicago 44, Ill.

Meters, Electrical Indicating

See also "Ammeters", "Volt-Ammeters, Clamp-on Type";
SIMPSON ELECTRIC CO.
5200 W. Kinzie St.
Chicago 44, Ill.

Mobile Power Plants

WHITE DIESEL ENGINE DIV.
1401 Sheridan Avenue
Springfield, Ohio

Motor Generator Sets

BROWN BOVERI CORP.
19 Rector Street
New York 6, N. Y.
COLUMBIA ELECTRIC MFG. CO.
4537 Hamilton Avenue
Cleveland 14, Ohio
CONSOLIDATED DIESEL ELECTRIC CORP. POWER EQUIPMENT DIVISION
880 Canal Street
Stamford, Connecticut
KATO ENGINEERING CO.
1443 First Avenue
Mankato, Minnesota
KURZ & ROOT CO., INC.
Appleton, Wisconsin

Motors, Electric, A. C.

ELECTRIC MACHINERY MFG. CO.
800 Central Avenue
Minneapolis 13, Minn.

Motors, Electric, A. C. & D. C.

BROWN BOVERI CORP.
19 Rector Street
New York 6, N. Y.
ELECTRO-MOTIVE DIV.
GENERAL MOTORS CORP.
La Grange, Ill.
ELLIOTT COMPANY
Jeannette, Pennsylvania
THE IDEAL ELECTRIC & MFG. CO.
Mansfield, Ohio
KATO ENGINEERING CO.
1443 First Avenue
Mankato, Minnesota

Motors, Gear

See also, "Gearmotors".
BRAD FOOTE GEAR WORKS, INC.
1315 S. Cicero Ave.
Cicero 50, Ill.
BROWN BOVERI CORP.
19 Rector Street
New York 6, N. Y.

Mufflers, Exhaust

NELSON MUFFLER CORP.
Box 60
Stoughton, Wisc.

Mufflers, Intake & Exhaust

See also headings under "Silencers".
BURGESS-MANNING CO.
INDUSTRIAL SILENCER DIV.
749 E. Park Avenue
Libertyville, Illinois
BURGESS-MANNING CO.
9207 Sovereign Road
Dallas, Texas
DONALDSON COMPANY, INC.
666 Pelham Blvd.
St. Paul 14, Minn.
KITTELL MUFFLER & ENGINEERING INC.
1977 Blake Avenue
Los Angeles 39, California

Mufflers, Spark Arresting

BURGESS-MANNING CO.
INDUSTRIAL SILENCER DIV.
749 E. Park Avenue
Libertyville, Illinois
BURGESS-MANNING CO.
9207 Sovereign Road
Dallas, Texas
KITTELL MUFFLER & ENGINEERING INC.
1977 Blake Avenue
Los Angeles 39, California
THE MAXIM SILENCER CO.
SUBSIDIARY OF EMHART MFG. CO.
85 Homestead Avenue
Hartford, Connecticut
NELSON MUFFLER CORP.
Box 60
Stoughton, Wisc.

Nickel Alloys

INTERNATIONAL NICKEL CO., INC.
67 Wall St.
New York 5, N. Y.

Nozzle Cleaning Tools

See also, "Test Stands".
BACHARACH INDUSTRIAL INSTRUMENT CO.
200 North Braddock Ave.
Pittsburgh 8, Pa.
KENT-MOORE ORG. INC.
28635 Mound Rd.
Warren, Michigan

Nozzle Testers

Select from "Diesel Test Equipment" listings;
AMERICAN BOSCH DIVISION
AMERICAN BOSCH ARMA CORP.
3664 Main Street
Springfield, Massachusetts
BACHARACH INDUSTRIAL INSTRUMENT CO.
200 North Braddock Ave.
Pittsburgh 8, Penn.
C.A.V. FUEL INJECTION EQUIPMENT DIV.
LUCAS ELECTRICAL SERVICE INC.
14820 Detroit Avenue
Cleveland 7, Ohio
DIESEL INJECTION SALES & SERVICE INC.
808 Union Street
Norfolk, Virginia
KENT-MOORE ORG. INC.
28635 Mound Road
Warren, Michigan
MARINE PUMPS, INC.
SPIRAL & UNITEST DIV.
226 North Marine Ave.
Wilmington, Calif.
ROBERT BOSCH CORP.
268 4th Ave.
New York 10, N. Y.

Nozzles, Fuel Injection

See also under "Injection Systems, Fuel", "Fuel Injection Sytems, Sales & Service", "Unit Injectors, Fuel Oil";
ALLYN MFG. COMPANY
1758 West Wellington Ave.
Chicago 13, Illinois
AMERICAN BOSCH DIVISION
AMERICAN BOSCH ARMA CORP.
3664 Main Street
Springfield 7, Massachusetts
C.A.V. FUEL INJECTION EQUIPMENT DIV.
LUCAS ELECTRICAL SERVICE INC.
14820 Detroit Avenue
Cleveland 7, Ohio
DIESEL FUEL INJECTION SERVICE INC.
9331 South Broadway
St. Louis 23, Missouri
ECLIPSE MACHINE DIVISION
BENDIX AVIATION CORP.
Elmira, New York

Nuts, Lock

COLUMBIA NUT & BOLT CO., INC.
945 Main Street
Bridgeport 3, Connecticut

Nuts, Plain & Castle

COLUMBIA NUT & BOLT CO., INC.
945 Main St.
Bridgeport 3, Conn.
HARTFORD MACHINE SCREW CO.
Box 1440
Hartford 2, Conn.

Oil Conditioners

Select from "Centrifugal Purifier" listings;
COMMERCIAL FILTER CORP.
2 Main St.
Melrose 76, Mass.
FRAM CORPORATION
Providence 16, R. I.
HOFFMAN-ALLEN CORP.
1400 E. Tampa
Springfield, Mo.
INDIANA COMMERCIAL FILTER CORP.
Lebanon, Ind.
WM. W. NUGENT & CO., INC.
3426 Cleveland St.
Skokie, Ill.
WINSLOW ENGINEERING & MFG. CO.
4069 Hollis St.
Oakland, Calif.

Oil Filler Closures

MOELLER MFG. CO., INC.
2401 Durand Avenue
Racine, Wisconsin

Oil Filter, Full-Flow and By-Pass Systems

DE LUXE PRODUCTS CORP.
1201 Michigan Blvd.
Racine, Wisconsin

Oil Level Gauge Dipsticks

MOELLER MFG. CO., INC.
2401 Durand Avenue
Racine, Wisconsin

Oil Purification Systems, Filtering Earth Type

Select from "Centrifugal Purifier" listings;
THE BRIGGS FILTRATION COMPANY
River Road
Washington 16, D. C.
COMMERCIAL FILTER CORP.
2 Main St.
Melrose 76, Mass.
THE HILLIARD CORP.
120 W. Fourth St.
Elmira, N. Y.
INDIANA COMMERCIAL FILTER CORP.
Lebanon, Ind.
WM. W. NUGENT & CO., INC.
3426 Cleveland St.
Skokie, Ill.

Oil Purification Systems Pressure and Gravity Types

Select from "Centrifugal Purifier" listings;
COMMERCIAL FILTER CORP.
2 Main St.
Melrose 76, Mass.

DE LAVAL SEPARATOR CO.
25 Columbia St.
Poughkeepsie, N. Y.
INDIANA COMMERCIAL FILTER CORP.
Lebanon, Ind.
WILLIAM W. NUGENT & CO., INC.
3426 Cleveland St.
Skokie, Ill.

Oil Seals & Grease Retainers
CLEVELAND GRAPHITE BRONZE CO.
(DIVISION OF CLEVITE CORP.)
17000 St. Clair Ave.
Cleveland 10, Ohio
THE FITZGERALD MFG. CO.
Torrington, Conn.
VICTOR MFG. & GASKET CO.
P. O. Box 1333
Chicago 90, Ill.

Oil Separators
See also "Centrifuges"
CENTRICO, INC.
75 West Forest Ave.
Englewood, N. J.

Oil Systems, Pressure & Gravity
WM. W. NUGENT & CO., INC.
3426 Cleveland St.
Skokie, Ill.

Oil Testing Equipment
THE GERIN CORPORATION
Avon, N. J.
LENGOR, INC.
Towns-Worth Bldg.
Annapolis, Md.

Oils, Diesel Fuel
See also "Fuel Oil, Diesel".
STANDARD OIL CO. OF CALIF.
WESTERN OPERATIONS, INC.
225 Bush St.
San Francisco 20, Calif.
STANDARD OIL CO. OF INDIANA
910 S. Michigan Ave.
Chicago, Ill.

Packaged Generators
CHICAGO PNEUMATIC TOOL CO.
6 E. 44th St.
New York 17, N. Y.
KURZ & ROOT CO., INC.
Appleton, Wisc.

Packing, Rod Metallic
THE ANCHOR PACKING CO
Philadelphia, Pa.
C. LEE COOK CO.
916 South 8 St.
Louisville 3, Kentucky

Packing, Oil Wiper
C. LEE COOK CO.
916 S. 8th St.
Louisville 3, Ky.

Packing, Sheet
THE ANCHOR PACKING CO.
Philadelphia, Pa.
VICTOR MFG. & GASKET CO.
P. O. Box 1333
Chicago 90, Ill.

Packing, Sheets, Oil & Water
THE DARCOID CO., INC.
145-6th Ave.
New York 13, N. Y.
VICTOR MFG. & GASKET CO.
P. O. Box 1333
Chicago 90, Ill.

Penetrant—Rust Solvent
SPRAY PRODUCTS CORP.
P. O. Box 584
Camden 1, N. J.

Penetrating Oil
SPRAY PRODUCTS CORP.
P. O. Box 584
Camden, N. J.

Pillow Blocks, Babbitted & Bronze-Bushed Bearings
CLEVELAND GRAPHITE BRONZE CO.
DIV. OF CLEVITE CORP.
17000 St. Clair Ave.
Cleveland 10, Ohio
HOOVER BALL & BEARING CO.
P. O. Box 607
Ann Arbor, Mich.

Pinions
BRAD FOOTE GEAR WORKS, INC.
1315 S. Cicero Ave.
Cicero 50, Ill.

Piping Prefabricated
ALCO PRODUCTS, INC.
30 Church St.
New York 8, N. Y.

Piston Grinders
VAN NORMAN AUTOMOTIVE
EQUIPMENT CO.
3640 Main St.
Springfield, Mass.

Piston Pin Bearings
See also under "Bearing" listings.
CLEVELAND GRAPHITE BRONZE CO.
DIV. OF CLEVITE CORP.
17000 St. Clair Ave.
Cleveland 10, Ohio

Piston Pin Bushing Borer
KENT-MOORE ORG., INC.
28635 Mound Rd.
Warren, Mich.
TOBIN-ARP MFG. CO.
6400 Penn Ave. S.
Minneapolis, Minn.
VAN NORMAN AUTOMOTIVE
EQUIPMENT CO.
3640 Main St.
Springfield 7, Mass.

Piston Pins
BURGESS-NORTON MFG. CO.
737 Peyton St.
Geneva, Ill.

Piston Ring Removers
KENT-MOORE ORGANIZATION, INC.
28635 Mound Rd.
Warren, Mich.
PERFECT CIRCLE CORP.
552 S. Washington
Hagerstown, Ind.

Piston Rings
C. LEE COOK MFG. CO.
916 South 8 St.
Louisville 3, Kentucky
DOUBLE SEAL RING COMPANY
2065 Montgomery Street
Fort Worth, Texas
KOPPERS CO., INC.
METAL PRODUCTS DIV.
200 Scott St.
Baltimore 29, Maryland
PERFECT CIRCLE CORP.
552 S. Washington
Hagerstown, Ind.
SEALED POWER CORP.
2001 Sanford Street
Muskegon 61, Michigan
WILKENING MANUFACTURING CO.
2000 South 71 Street
Philadelphia 42, Pennsylvania

Piston Rings, Oil Control
C. LEE COOK CO.
916 South 8 St.
Louisville 3, Kentucky
DOUBLE SEAL RING COMPANY
2065 Montgomery Street
Fort Worth, Texas
KOPPERS COMPANY, INC.
METAL PRODUCTS DIV.
200 Scott St.
Baltimore 29, Maryland
PERFECT CIRCLE CORP.
552 S. Washington
Hagerstown, Ind.
WILKENING MANUFACTURING CO.
2000 South 71 Street
Philadelphia 42, Pennsylvania

Piston Rings, Sealing
C. LEE COOK CO.
916 South 8 St.
Louisville 3, Kentucky
DOUBLE SEAL RING CO.
2065 Montgomery Street
Fort Worth, Texas
KOPPERS CO. INC.
METAL PRODUCTS DIV.
200 Scott St.
Baltimore 29, Maryland
PERFECT CIRCLE CORP.
552 S. Washington
Hagerstown, Ind.
SEALED POWER CORPORATION
2001 Sanford Street
Muskegon 61, Michigan
WILKENING MANUFACTURING CO.
2000 S. 71st Street
Philadelphia 42, Pa.

Pistons
GILLETT & EATON, INC.
846 Doughty Street
Lake City, Minnesota
SEALED POWER CORPORATION
2001 Sanford Street
Muskegon 61, Michigan
UNITED ENGINE & MACHINE CO.
310 Preda St.
San Leandro, Calif.
ZOLLNER MACHINE WORKS
Fort Wayne, Indiana

Pistons, Aluminum Alloy
ALUMINUM COMPANY OF AMERICA
1501 Alcoa Bldg.
Pittsburgh 19, Pa.
GILLETT & EATON, INC.
846 Doughty St.
Lake City, Minnesota
UNITED ENGINE & MACHINE CO.
310 Preda St.
San Leandro, Calif.
ZOLLNER MACHINE WORKS
Fort Wayne, Indiana

Pistons, Aluminum Alloy, Repaired
RALPH STARK, INC.
43-12 33rd St.
Long Island City 1, N. Y.

Pistons, Bi-Metallic
UNITED ENGINE & MACHINE CO.
310 Preda St.
San Leandro, Calif.

Pistons, Cast Iron
GILLETT & EATON, INC.
846 Doughty St.
Lake City, Minnesota

Pistons, Heavy Duty
ZOLLNER MACHINE WORKS
Fort Wayne, Indiana

Plate Heat Exchangers
THE DE LAVAL SEPARATOR CO.
25 Columbia St.
Poughkeepsie, N. Y.

Plating, Chrome
See also "Chromium" headings.
CHROMIUM CORP. OF AMERICA
100 Park Avenue
New York 17, New York

METAL FINISHERS, INC.
1725 E. 27th St.
Cleveland 14, Ohio
SPAR-TAN ENGINEERING CO.
496 Bauchet St.
Los Angeles 12, Calif.
VAN DER HORST CORP. OF AMERICA
1313 E. State St.
Olean, N. Y.
VAN DER HORST CORP. OF. AMERICA
Grove & Delpha St.
Tarrell, Texas
VAN DER HORST CORP. OF AMERICA
2610 S. Shields Ave.
Chicago, Ill.

Plating, Iron

VAN DER HORST CORP. OF AMERICA
1313 E. State St.
Olean, N. Y.
VAN DER HORST CORP. OF AMERICA
Grove & Delpha St.
Tarrell, Texas
VAN DER HORST CORP. OF AMERICA
2610 S. Shields Ave.
Chicago, Ill.

Plating, Porous Chrome

SPAR-TAN ENGINEERING CO.
496 Bauchet St.
Los Angeles 12, Calif.

Porous Chrome Plating

SPAR-TAN ENGINEERING CO.
496 Bauchet St.
Los Angeles 12, Calif.

Portable Power Units

See also "Auxiliary Generator" listings
ALCO PRODUCTS, INC.
30 Church St.
New York 8, N. Y.
AMERICAN M-A-N CORP.
149 Broadway
New York 6, N. Y.
CHICAGO PNEUMATIC TOOL CO.
6 E. 44th St.
New York 17, N. Y.
CONSOLIDATED DIESEL ELECTRIC CORP.
POWER EQUIPMENT DIVISION
880 Canal St.
Stamford, Conn.
WHITE DIESEL ENGINE DIVISION
WHITE MOTOR CO.
Springfield, Ohio

Power Plants, Automatically Controlled

See also "Auxiliary Generator" listings
BROWN-BOVERI CORP.
19 Rector St.
New York 6, N. Y.
CHICAGO PNEUMATIC TOOL CO.
6 East 44 St.
New York 17, N. Y.
CONSOLIDATED DIESEL ELECTRIC CORP., POWER EQUIPMENT DIVISION
880 Canal St.
Stamford, Conn.
NATIONAL METAL & STEEL CORP.
1251 New Dock St.
Terminal Island, Calif.
WHITE DIESEL ENGINE DIV.
WHITE MOTOR CO.
Springfield, Ohio

Power Supply, Standby Uninterrupted, 10-100 KW

CONSOLIDATED DIESEL ELECTRIC CORP., POWER EQUIPMENT DIVISION
880 Canal St.
Stamford, Conn.

Power Take-Off Units

See also "Clutch" headings.
ROCKFORD CLUTCH DIVISION
BORG-WARNER CORPORATION
1301 18th Avenue
Rockford, Ill.
TWIN DISC CLUTCH CO.
1328 Racine St.
Racine, Wisc.

Power Units

See also "Auxiliary Generator" listings
AMERICAN M-A-N CORP.
149 Broadway
New York 6, N. Y.
CONSOLIDATED DIESEL ELECTRIC CORP., POWER EQUIPMENT DIVISION
880 Canal Street
Stamford, Conn.
FORD MOTOR CO.,
INDUSTRIAL ENG. DEPT.
Southfield Rd at Rotunda Drive
P. O. Box 598
Dearborn, Mich.
HERCULES MOTOR CORP.
101 11th St., S.E.
Canton 2, Ohio
INTERNATIONAL HARVESTER CO.
180 N. Michigan Ave.
Chicago 1, Ill.

Preheaters, Engine, Electric

TECH PRODUCTS, INC.
615 Pennsylvania Ave.
Elizabeth, N. J.

Pressure Switches

See also "Switches"
DETROIT CONTROLS CORP.
5900 Trumbull Ave.
Detroit 8, Michigan
FRANK W. MURPHY MFG., INC.
Box 4537
Tulsa 1, Okla.
ROCHESTER MFG. CO., INC.
34 Rockwood St.
Rochester 10, N. Y.
SYNCHRO-START PRODUCTS
8151 N. Ridgeway Ave.
Skokie, Ill.

Pullers, Gear, Bushing, Wheel

See also "Bearing Pullers".
SNAP-ON TOOLS CORP.
Kenosha, Wisconsin

Pump Calibrating Test Stands

See also "Test Stand, Diesel Fuel Pump"
BACHARACH INDUSTRIAL INSTRUMENT CO.
200 N. Braddock Ave
Pittsburgh 8, Pa.

Pumping Units, Diesel

See also "Diesel Pumping Units".
AMERICAN MARC INC.
1601 W. Florence Ave.
Inglewood, Calif.
CONSOLIDATED DIESEL ELECTRIC CORP., POWER EQUIPMENT DIVISION
880 Canal St.
Stamford, Conn.
ENTERPRISE ENGINE & MACHINERY CO.
18th & Florida Sts.
San Francisco, Calif.
LISTER-BLACKSTONE, INC.
42-32 21st St.
Long Island City 1, N. Y.
NORDBERG MANUFACTURING CO.
3073 S. Chase Avenue
Milwaukee 1, Wisconsin
R. H. SHEPHERD CO., INC.
HANOVER, PA.
WHITE DIESEL ENGINE DIVISION
THE WHITE MOTOR CO.
1401 Sheridan Ave.
Springfield, Ohio

Pumps, Automatic Reversing

TUTHILL PUMP CO.
939 East 95 St.
Chicago 19, Ill.
VIKING PUMP CO.
4th & Jorgensen Streets
Cedar Falls, Iowa

Pumps, Centrifugal

DELAVAL STEAM TURBINE CO.
Trenton 2, N. J.
ENGINEERING CO., LTD.
Dr. Alfred J. Buchi
Winterthur, Switzerland
INGERSOLL-RAND CO.
11 Broadway
New York 4, N. Y.

Pumps, Cooling Water

SCHWITZER CORPORATION
1125 Massachusetts Ave.
Indianapolis, Ind.

Pumps, Fuel Oil Injection

See also "Injection Equipment", etc.
AMERICAN BOSCH DIVISION
AMERICAN BOSCH ARMA CORP.
3664 Main St.
Springfield 7, Mass.
C.A.V. FUEL INJECTION EQUIPMENT, DIV. OF LUCAS ELECTRICAL SERVICES, INC.
14820 Detroit Ave.
Cleveland 7, Ohio
FLORIDA DIESEL & ELECTRIC CO.
1930 N. Miami Ave.
Miami 36, Florida
HARTFORD MACHINE SCREW CO.
Box 1440
Hartford 2, Connecticut
SCINTILLA DIV.
BENDIX AVIATION CORP.
Sidney, N. Y.

Pumps, Fuel Transfer

DELAVAL STEAM TURBINE CO.
Trenton 2, N. J.
ECLIPSE MACHINE DIV.
BENDIX AVIATION CORP.
Elmira, N. Y.
HARTFORD MACHINE SCREW CO.
Box 1440
Hartford 2, Conn.
ROPER HYDRAULICS, INC.
167 Blackhawk Park Ave.
Rockford, Ill.
TUTHILL PUMP CO.
939 E. 95th St.
Chicago 19, Ill.
VIKING PUMP CO.
4th & Jorgensen Streets
Cedar Falls, Iowa

Pumps, Hydraulic

DE LAVAL STEAM TURBINE CO.
Trenton 2, N. J.

Pumps, Hydraulic Controls

DE LAVAL STEAM TURBINE CO.
Trenton 2, N. J.
ROPER HYDRAULICS, INC.
166 Blackhawk Park Ave.
Rockford, Ill.
TUTHILL PUMP CO.
939 E. 95th St.
Chicago 19, Ill.

Pumps, Lubricating Oil

DELAVAL STEAM TURBINE CO.
Trenton 2, N. J.

MANZEL DIV.
HOUDAILLE INDUSTRIES, INC.
315 Babcock St.
Buffalo 10, N. Y.

GEO. D. ROPER HYDRAULICS INC.
167 Blackhawk Park Avenue
Rockford, Illinois

TUTHILL PUMP CO.
939 E. 95th St.
Chicago 19, Ill.

Pumps, Oil

DELAVAL STEAM TURBINE CO.
Trenton 2, N. J.

GEO. D. ROPER HYDRAULICS INC.
167 Blackhawk Park Avenue
Rockford, Illinois

SCHWITZER CORP.
1125 Massachusetts Avenue
Indianapolis, Indiana

TUTHILL PUMP CO.
939 East 95th Street
Chicago 19, Illinois

VIKING PUMP CO.
4th & Jorgensen Streets
Cedar Falls, Iowa

Pumps, Rotary Gear Type

DE LAVAL STEAM TURBINE CO.
Trenton 2, New Jersey

GEO. D. ROPER HYDRAULICS INC.
167 Blackhawk Park Avenue
Rockford, Illinois

TUTHILL PUMP CO.
939 E. 95th St.
Chicago 19, Ill.

VIKING PUMP CO.
4th & Jorgensen Streets
Cedar Falls, Iowa

Pumps, Rotary, Screw Type

DELAVAL STEAM TURBINE CO.
Trenton 2, N. J.

Pumps, Rotary, Vane Type

CURTISS-WRIGHT CORPORATION
MARQUETTE DIVISION
1145 Galewood Drive
Cleveland 10, Ohio

Pumps, Stripped Models

STEWART & STEVENSON SERVICES, INC.
4516 Harrisburg
Houston, Texas

TUTHILL PUMP CO.
939 E. 95th St.
Chicago 19, Ill.

VIKING PUMP CO.
4th & Jorgensen Streets
Cedar Falls, Iowa

Pumps, Vacuum

KENT-MOORE ORG. INC.
28635 Mound Road
Warren, Michigan

Purifiers, Fuel Oil

See also "Centrifugal Purifier" listings, and "Purifier" listings;

CENTRICO, INC.
75 West Forest Avenue
Englewood, New Jersey

COMMERCIAL FILTER CORP.
2 Main St.
Melrose 76, Mass.

DE LAVAL SEPARATOR CO.
25 Columbia St.
Poughkeepsie, N. Y.

INDIANA COMMERCIAL FILTER CORP.
Lebanon, Ind.

WILLIAM W. NUGENT & CO., INC.
3426 Cleveland St.
Skokie, Illinois

THE SHARPLES CORP.
2300 Westmoreland St.
Philadelphia 40, Pa.

Purifiers, Industrial Oil

See also "Centrifugal Purifier" listings, and "Purifier" listings;

CENTRICO, INC.
75 West Forest Avenue
Englewood, New Jersey

COMMERCIAL FILTER CORP.
2 Main St.
Melrose 76, Mass.

DE LAVAL SEPARATOR CO.
25 Columbia St.
Poughkeepsie, N. Y.

INDIANA COMMERCIAL FILTER CORP.
Lebanon, Ind.

WILLIAM W. NUGENT & CO., INC.
3426 Cleveland St.
Skokie, Illinois

THE SHARPLES CORPORATION
2300 Westmoreland Street
Philadelphia 40, Pennsylvania

Purifiers, Lubricating Oil

See also "Centrifugal Purifier" listings, and "Purifier" listings;

CENTRICO, INC.
75 West Forest Avenue
Englewood, New Jersey

COMMERCIAL FILTER CORP.
2 Main St.
Melrose 76, Mass.

THE DE LAVAL SEPARATOR CO.
The De Laval Bldg.
Poughkeepsie, N. Y.

INDIANA COMMERCIAL FILTER CORP.
Lebanon, Ind.

WILLIAM W. NUGENT & CO., INC.
3426 Cleveland St.
Skokie, Illinois

THE SHARPLES CORPORATION
2300 Westmoreland Street
Philadelphia 40, Pennsylvania

Purifiers, Oil

See also "Centrifugal Purifier" listings, and "Purifier" listings;

CENTRICO, INC.
75 West Forest Avenue
Englewood, New Jersey

COMMERCIAL FILTER CORP.
2 Main St.
Melrose 76, Mass.

DE LAVAL SEPARATOR CO.
25 Columbia St.
Poughkeepsie, N. Y.

THE HILLIARD CORP.
120 West Fourth St.
Elmira, New York

HOFFMAN-ALLEN CORP.
1400 E. Tampa
Springfield, Mo.

INDIANA COMMERCIAL FILTER CORP.
Lebanon, Ind.

WILLIAM W. NUGENT & CO., INC.
3426 Cleveland St.
Skokie, Illinois

THE SHARPLES CORPORATION
2300 Westmoreland Street
Philadelphia 40, Pennsylvania

Push Rods

THE CHICAGO SCREW CO.
DIV. STANDARD SCREW CO.
2701 Washington Blvd.
Bellwood, Ill.

Pyrometers, Exhaust

ILLINOIS TESTING LABORATORIES, INC.
420 N. LaSalle St.
Chicago 10, Ill.

MINNEAPOLIS-HONEYWELL REGULATOR CO.
INDUSTRIAL DIVISION
Wayne and Windrim Avenues
Philadelphia 44, Pennsylvania

Pyrometers, Portable

ILLINOIS TESTING LABORATORIES, INC.
420 N. LaSalle St.
Chicago 10, Ill.

Racks, Gear

BRAD FOOTE GEAR WORKS, INC.
1315 S. Cicero Ave.
Cicero 50, Ill.

Radiator Cooling System Treatment

See also "Cooling Water Treating Chemicals"

YOUNG RADIATOR COMPANY
709 South Marquette St.
Racine, Wisconsin

Radiators, Engine Cooling

See also "Cooling Equipment, Engine Radiators" listings;

MC CORD CORP.
Riopelle at E. Grand Bldg.
Detroit 11, Mich.

PERFEX CORPORATION
300 West Oklahoma Ave.
Milwaukee 7, Wisc.

THE ROME-TURNEY RADIATOR CO.
Rome, New York

YATES-AMERICAN MACHINE CO.
Fourth Street
Beloit, Wisconsin

YOUNG RADIATOR COMPANY
709 S. Marquette St.
Racine, Wisconsin

Rail Car Engines

AMERICAN M-A-N CORPORATION
149 Broadway
New York 6, New York

HERCULES MOTOR CORP.
101 11th St.
Canton, Ohio

STERLING ENGINE COMPANY, INC.
Menominee, Michigan

Reamers, Valve Guide

HALL-TOLEDO INC.
2931 South Ave.
Toledo 9, Ohio

Reclaimers, Oil

See also "Oil Reclamation Systems"

COMMERCIAL FILTER CORP.
2 Main St.
Melrose 76, Mass.

THE HILLIARD CORP.
120 West 4th St.
Elmira, N. Y.

HOFFMAN-ALLEN CORP.
1400 E. Tampa
Springfield, Mo.

INDIANA COMMERCIAL FILTER CORP.
Lebanon, Ind.

Reducers, Speed

BRAD FOOTE GEAR WORKS, INC.
1315 S. Cicero Ave.
Cicero 50, Ill.

Regulators, Current & Voltage

See also "Voltage Regulators";

BROWN BOVERI CORP.
19 Rector Street
New York 6, N. Y.

DELCO-REMY DIVISION
GENERAL MOTORS CORP.
2401 Columbus Ave.
Anderson, Indiana

THE ELECTRIC AUTO-LITE CO.
Champlain Street
Toledo 1, Ohio

Regulators, Generator Voltage

See also "Regulators, Current and Voltage", "Voltage Regulators";

AMERICAN BOSCH DIVISION
AMERICAN BOSCH ARMA CORP.
3664 Main Street
Springfield, Massachusetts

BROWN BOVERI CORP.
19 Rector St., N. Y. 6, N. Y.
ELECTRIC AUTO-LITE CO., THE
Champlain St.
Toledo 1, Ohio
ELECTRIC MACHINERY MFG. CO.
800 Central Ave.
Minneapolis 13, Minn.

Regulators, Speed

BROWN BOVERI CORP.
19 Rector St., N. Y. 6, N. Y.

Regulators, Temperature

See also "Temperature Regulators" listings, and "Cooling Water" listings;

AMOT CONTROLS CORP.
1st St. & Nevin Ave., Box 1707
Richmond 1, Calif.
DETROIT CONTROLS CORP.
5900 Trumbull Ave.
Detroit 8, Mich.
FULTON-SYLPHON DIVISION
ROBERTSHAW-FULTON CONTROLS CO.
P. O. Box 400
Knoxville 4, Tennessee
THE POWERS REGULATOR CO.
3400 Oakton Street
Skokie, Illinois

Relays

SIMPSON ELECTRIC CO.
5200 W. Kinzie St.
Chicago 44, Ill.

Repairs, Diesel

See also listings under "Castings", "Crankshaft", "Cylinder Head", and "Liner" repairs

METALOCK REPAIR SERVICE, INC.
36-15 48th Avenue
Long Island City 1, N. Y.
SALSBURY CORPORATION
1161 E. Florence Ave.
Los Angeles 1, Calif.
WHITE DIESEL ENGINE DIV.
1401 Sheridan Ave.
Springfield, Ohio

Repair Stands, Engine

KENT-MOORE ORG. INC.
28635 Mound Road
Warren, Michigan

Replacement Parts—Injection Systems

See also "Injection Systems" listings and "Service" listings;

BELL DIESEL RESEARCH
P. O. Box 842
Glendale 5, Calif.
KORODY MARINE CORPORATION
12822 Simms Avenue
Hawthorne, California
PACIFIC DIESEL PARTS
4650 East Florence Avenue
Bell, California

Rocker Arms

THE CHICAGO SCREW CO.
Div. Standard Screw Co.
2701 Washington Blvd.
Bellwood, Illinois

Rust Preventives

See also "Corrosion Inhibitors" listings and "Anti-Rust Compounds" listings

OAKITE PRODUCTS INC.
22C Rector St., N. Y. 6, N. Y.
YOUNG RADIATOR COMPANY
709 S. Marquette St.
Racine, Wisconsin

Rust Removers

See also "Cleaners", listings and "Solvents, Rust" listings;

OAKITE PRODUCTS, INC.
22C Rector St., N. Y. 6, N. Y.

Safety Controls, Engine

See also "Controls, Engine Safety"

AMOT CONTROLS CORP.
P. O. Box 1707
Richmond 1, California
DETROIT CONTROLS CORP.
5900 Trumbull Avenue
Detroit 8, Michigan
FRANK W. MURPHY MFG., INC.
Box 4537
Tulsa 1, Oklahoma
ROBERTSHAW-FULTON CONTROLS CO.
FULTON SYLPHON DIVISION
P. O. Box 400
Knoxville 1, Tenn.
MINNEAPOLIS-HONEYWELL REGULATOR CO.
INDUSTRIAL DIV.
Wayne & Windrim Aves.
Philadelphia 44, Pa.
PENN CONTROLS, INC.
Goshen, Indiana
SYNCHRO-START PRODUCTS, INC.
8151 N. Ridgeway Ave.
Skokie, Illinois
VIKING INSTRUMENTS, INC.
Towne St.
East Haddam, Conn.

Screw Machine Products

See also "Machine Shop Repairs" listings;

BURGESS-NORTON MFG. CO.
737 Peyton Street
Geneva, Illinois
HARTFORD MACHINE SCREW CO.
Box 1440
Hartford 2, Connecticut
SCHWITZER CORP.
1125 Massachusetts Ave.
Indianapolis 7, Indiana

Screw Machine Products, Hardened & Ground

See also "Hardened & Ground Products" listings;

ALLYN MFG. CO.
1758 W. Wellington Ave.
Chicago 13, Illinois
BURGESS-NORTON MFG. CO.
737 Peyton Street
Geneva, Illinois
THE CHICAGO SCREW CO.
DIV. STANDARD SCREW CO.
2701 Washington Blvd.
Bellwood, Illinois
HARTFORD MACHINE SCREW CO.
Box 1440
Hartford 2, Connecticut

Sealing Rings

CLEVITE SERVICE DIVISION
CLEVELAND GRAPHITE BRONZE CO.
6545 Carnegie Avenue
Cleveland 3, Ohio
SEALED POWER CORP.
2001 Sanford St.
Muskegon, Mich.

Seals, Automatic Shaft

SCHWITZER CORP.
1125 Massachusetts Ave.
Indianapolis 7, Ind.

Self-Retaining Nuts

See also "Nut" listings;

COLUMBIA NUT & BOLT CO., INC.
945 Main St.
Bridgeport 3, Conn.

Separators

See also "Centrifugal Purifiers", "Purifiers", "Clarifiers, Oil" "Conditioners", and "Fuel & Lube Oil" listings;

CENTRICO, INC.
75 West Forest Avenue
Englewood, New Jersey

Shafts, Hardened and Ground

ALLYN MFG. CO.
1758 W. Wellington Ave.
Chicago 13, Illinois
BURGESS-NORTON MFG. CO.
737 Peyton Street
Geneva, Illinois
HARTFORD MACHINE SCREW CO.
Box 1440
Hartford 2, Conn.

Shock Absorbers, Rotary

HOUDAILLE INDUSTRIES, INC.
BUFFALO HYDRAULICS DIV.
537 E. Delavan Ave.
Buffalo 11, N. Y.

Shutters

KYSOR HEATER CO.
1100 W. Wright St.
Cadillac, Mich.

Signals—Pressure, Liquid Level, Temperature

See also "Indicator" listings;

FRANK W. MURPHY MFG., INC.
Box 4537
Tulsa 1, Okla.
ROCHESTER MFG. CO., INC.
Rockwood St.
Rochester 10, N. Y.
VIKING INSTRUMENTS, INC.
Towne St.
East Haddam, Conn.

Silencers, Air Filter, Intake

BURGESS-MANNING CO.
INDUSTRIAL SILENCER DIV.
749 E. Park Ave.
Libertyville, Illinois
Dallas, Texas, 9207 Sovereign Rd.

Silencers, Exhaust

BURGESS-MANNING CO.
INDUSTRIAL SILENCER DIV.
749 E. Park Ave.
Libertyville, Illinois
Dallas, Texas, 9207 Sovereign Rd.
DONALDSON COMPANY, INC.
666 Pelham Blvd.
St. Paul 14, Minn.
KITTELL MUFFLER & ENGRG., INC.
1977 Blake Avenue
Los Angeles 39, California
KOPPERS CO., INC.
METAL PRODUCTS DIV.
200 Scott St.
Baltimore 29, Md.
MAXIM SILENCER CO.
SUBSIDIARY OF EMHART MFG. CO.
85 Homestead Ave.
Hartford, Conn.
NELSON MUFFLER CORP.
Box 60
Stoughton, Wisconsin

Silencers, Intake

See heading above.

AIR MAZE CORP.
25000 Miles Rd.
Cleveland 28, Ohio
BURGESS-MANNING CO.
INDUSTRIAL SILENCER DIV.
749 E. Park Ave.
Libertyville, Illinois
Dallas, Texas, 9207 Sovereign Rd.
DONALDSON COMPANY, INC.
666 Pelham Blvd.
St. Paul 14, Minn.
KITTELL MUFFLER & ENGRG., INC.
1977 Blake Avenue
Los Angeles 39, California
KOPPERS CO., INC.
METAL PRODUCTS DIV.
200 Scott St.
Baltimore 29, Md.
MAXIM SILENCER CO.
SUBSIDIARY OF EMHART MFG. CO.
85 Homestead Ave.
Hartford, Conn.

Sintered Powder Metal Parts
BURGESS-NORTON MFG. CO.
737 Peyton St.
Geneva, Ill.

Solvents
See also "Cleaning Compounds"
LIX CORPORATION OF MISSOURI
300 W. 80th St.
Kansas City, Missouri
OAKITE PRODUCTS, INC.
22C Rector St.
New York 6, N. Y.

Solvents, Degreasing
See also "Cleaning Compounds"
BRULIN & COMPANY, INC.
2939-45 Columbia Ave.
Indianapolis 7, Ind.
LIX CORPORATION OF MISSOURI
300 W. 80th St.
Kansas City, Missouri
LUBAID COMPANY
3270 S. 3rd St.
Milwaukee 7, Wisc.
MAGNUSON PRODUCTS CORP.
50 Court St.
Brooklyn 1, N. Y.
OAKITE PRODUCTS, INC.
22C Rector St.
New York 6, N. Y.

Solvents for Petroleum Residues
BRULIN & CO., INC.
2939-45 Columbia Ave.
Indianapolis 7, Ind.
LIX CORPORATION OF MISSOURI
300 W. 80th St.
Kansas City, Missouri
LUBAID COMPANY
3270 S. 3rd St.
Milwaukee 7, Wisc.

Solvents, Rust
See also "Rust Removers", "Cleaning Compounds"
SPRAY PRODUCTS CORP
P. O. BOX 584
Camden, N. J.

Spark Arrestors
BURGESS-MANNING CO.
(INDUSTRIAL SILENCER DIV.)
749 E. Park Ave., Libertyville, Ill.
9207 Sovereign Rd., Dallas Texas
KITTELL MUFFLER & ENGINEERING CO.
1977 Blake Ave.
Los Angeles 39, Calif.

Spark Plugs, Diesel Starting
ROBERT BOSCH CORP.
40-25 Crescent St.
Long Island City, N. Y.

Spark Plugs, Gas Engine
FLORIDA DIESEL & ELECTRIC CO.
1930 N. Miami Ave.
Miami 36, Fla.

Speed Reducers and Increasers
See also "Reducers, Speed"
BRAD FOOTE GEAR WORKS, INC.
1315 S. Cicero Avenue
Cicero 50, Ill.
DE LAVAL STEAM TURBINE CO.
Trenton 2, N. J.
FARRIS PICKERING GOVERNOR CO.,
556 Commercial Ave.
Palisades Park, N. J.
SNOW-NABSTEDT GEAR CORP.
251 Welton St.
Hamden, Conn.

Spray Nozzles, Fuel Injection
See also under "Nozzle" listings
ALLYN MFG. CO.
1758 W. Wellington Ave.
Chicago 13, Ill.
AMERICAN BOSCH DIVISION
AMERICAN BOSCH ARMA CORP.
3664 Main St.
Springfield 7, Mass.
C. A. V. (Fuel Injection Equip.) DIVISION
of LUCAS ELECTRICAL SERVICES, INC.
14820 Detroit Avenue
Cleveland 7, Ohio
FLORIDA DIESEL & ELECTRIC CO.
1930 N. Miami Ave.
Miami 36, Fla.
SCINTILLA DIVISION
BENDIX AVIATION CORP.
Sherman Ave.
Sidney, New York
UNEX PRODUCTS CORP.
1841 Broadway
New York 23, N. Y.

Spray, Starting Fluid
See also "Starting Fluid" headings
SPRAY PRODUCTS CORP.
P. O. Box 584
Camden N. J.

Sprockets
ALLYN MFG. CO.
1758 W. Wellington Ave.
Chicago 13, Ill.
DIAMOND CHAIN CO.
402 Kentucky Ave.
Indianapolis 7, Indiana

Starter Drives
See also "Drives Starter"
BENDIX AVIATION CORP.
ECLIPSE MACHINE DIVISION
Elmira, New York

Starting Air Compressors, Combination Motor and Engine Driven
QUINCY COMPRESSOR CO.
Quincy, Ill.

Starting Air Compressors, Engine Driven
See also headings under "Compressors"
INGERSOLL-RAND CO.
11 Broadway
New York, N. Y.
QUINCY COMPRESSOR CO.
Dept. DP
Quincy, Ill.

Starting Air Compressors, Motor Driven
See also headings above
INGERSOLL-RAND CO.
11 Broadway
New York, N. Y.
QUINCY COMPRESSOR CO.
Dept. DP
Quincy, Ill.
WORTHINGTON CORP.
Worthington Ave.
Harrison, N. J.

Starting Batteries, Storage
See also headings under "Batteries".
NIFE, INC.
Lambert Ave.
Copiague, N. Y.

Starting Fluid
See also "Fluid Diesel Starting"
SPRAY PRODUCTS CORP.
P. O. Box 584
Camden, N. J.

Starting Fluid, Aerosol & Pint Cans
START PILOT CORP.
61 Second St.
Mineola, N. Y.

Starting Fluid, Multi-Start Aluminum Capsules
START PILOT CORP.
61 Second St.
Mineola, N. Y.

Starting Motors, Diesel Air
See also "Motor" headings, also "Air Starting Motors, Diesel Engines";
INGERSOLL-RAND CO.
11 Broadway
New York, N. Y.

Starting Motors, Diesel Electric
See also "Motor" headings;
ROBERT BOSCH CORP.
4023 Crescent St.
Long Island City, N. Y.
THE ELECTRIC AUTO-LITE CO.
Champlain Street
Toledo 1, Ohio

Starting Motors, Hydraulic
AMERICAN BOSCH ARMA CORP.
AMERICAN BOSCH DIVISION
3664 Main Street
Springfield 7, Mass.
DETROIT DIESEL ENGINE DIV.
OF GENERAL MOTORS
13400 West Outer Drive
Detroit 28, Michigan

Starting Primer
START PILOT CORPORATION
61 Second Street
Mineola, New York

Steam Cleaning Equipment
CLAYTON MANUFACTURING CO.
401 N. Temple
El Monte, California
OAKITE PRODUCTS, INC.
22C Rector Street
New York 6, N. Y.

Steel Pipe Welded
ALCO PRODUCTS, INC.
30 Church St.
New York 8, N. Y.

Strainers, Oil
COMMERCIAL FILTER CORP.
2 Main St.
Melrose 76, Mass.
ELLIOTT COMPANY
Jeannette, Pa.
INDIANA COMMERCIAL FILTER CORP.
Lebanon, Ind.
WM. W. NUGENT & CO., INC.
3426 Cleveland St.
Skokie, Ill.

Strainers, Water, Single & Duplex
ELLIOTT CO.
Jeannette, Pa.
WM. W. NUGENT & CO., INC.
3426 Cleveland St.
Skokie, Ill.

Superchargers, Fixed Ratio
PAXTON PRODUCTS
929 Olympic Blvd.
Santa Monica, Calif.

Superchargers, Variable Ratio
PAXTON PRODUCTS
929 Olympic Blvd.
Santa Monica, Calif.

Supercharger Intercoolers
See also "Intercoolers";
YOUNG RADIATOR COMPANY
709 South Marquette St.
Racine, Wisconsin

Supercharging Blowers
See also "Blower" headings;
ENGINEERING CO., LTD.
Dr. Alfred J. Buchi
Winterthur, Switzerland

MIEHLE-DEXTER SUPERCHARGER DIV.
100 Fourth
Racine, Wisconsin
PAXTON PRODUCTS
929 Olympic Blvd.
Santa Monica, Calif.
SCHWITZER CORP.
1125 Massachusetts Ave.
Indianapolis 7, Indiana
THOMPSON PRODUCTS, INC.
JET DIVISION
23555 Euclid Avenue
Cleveland 17, Ohio

Surface, Heat Exchanger

See also "Heat Exchanger" headings;
THE ROME-TURNEY RADIATOR CO.
Rome, New York

Switchboard & Instruments

IDEAL ELECTRIC & MFG. CO.
Mansfield, Ohio

Switches, Manual

ROCHESTER MFG. CO., INC.
Rockwood St.
Rochester 10, N. Y.

Switches, Solenoid

THE ELECTRIC AUTO-LITE CO.
Champlain Street
Toledo 1, Ohio
SYNCHRO-START PRODUCTS, INC.
8151 N. Ridgeway Avenue
Skokie, Illinois

Switches, Starting

ECLIPSE MACHINE DIV.
BENDIX AVIATION CORP.
Elmira, N. Y.

Switchgear

BROWN BOVERI CORP.
19 Rector Street
New York 6, N. Y.
CONSOLIDATED DIESEL ELECTRIC CORP.
POWER EQUIPMENT DIVISION
880 Canal Street
Stamford, Connecticut
ELECTRIC MACHINERY MFG. CO.
800 Central Ave.
Minneapolis 13, Minn.
IDEAL ELECTRIC & MFG. CO.
Mansfield, Ohio

Switchgear Batteries

See also "Batteries" listings;
NIFE, INC.
Lambert Ave.
Copiague, N. Y.

Synchronizers, Automatic

See also "Automatic Control" headings;
BROWN BOVERI CORP.
19 Rector Street
New York 6, N. Y.
ELECTRIC MACHINERY MFG. CO.
800 Central Ave.
Minneapolis 13, Minn.

Systems, Fuel Injection

See also headings under "Injection";
C.A.V. FUEL INJECTION & EQUIPMENT
LUCAS ELECTRICAL SERVICES, INC.
14820 Detroit Avenue
Cleveland 7, Ohio
SCINTILLA DIVISION
BENDIX AVIATION CORP.
Sidney, New York
UNEX PRODUCTS CORP.
1841 Broadway
New York 23, N. Y.

Tachometers, Hand

KENT-MOORE ORGANIZATION, INC.
28635 Mound Rd.
Warren, Mich.

Tachometers, Mechanical

BARBOUR STOCKWELL CO.
205 Broadway
Cambridge 39, Mass.

Tachometers, Recording

WAGNER ELECTRIC CORP.
6400 Plymouth Avenue
St. Louis 14, Missouri

Temperature Recorders

BACHARACH INDUSTRIAL INSTRUMENT CO.
200 North Braddock Avenue
Pittsburgh 8, Pennsylvania
POWERS REGULATOR CO.
3400 Oakton St.
Skokie, Ill.

Temperature Regulators, Cooling Water

See also "Regulators, Temperature";
AMOT CONTROLS CORP.
1st St. & Nevin Ave., Box 1707
Richmond 1, Calif.
THE POWERS REGULATOR CO.
3400 Oakton Street
Skokie, Illinois

Test Stands, Diesel Fuel Pump

BACHARACH INDUSTRIAL INSTRUMENT CO.
200 North Braddock Avenue
Pittsburgh 8, Pennsylvania
DIESEL INJECTION SALES & SERVICE INC.
808 Union Street
Norfolk, Virginia

Testers, Nozzle

See also under "Injector Test Stands";
BACHARACH INDUSTRIAL INSTRUMENT CO.
200 North Braddock Avenue
Pittsburgh 8, Pennsylvania
DIESEL INJECTION SALES & SERVICE INC.
808 Union Street
Norfolk, Virginia
KENT-MOORE ORG. INC.
28635 Mound Road
Warren, Michigan

Testers, Torque Wrench

P. A. STURTEVANT CO.
Addison, Illinois

Testers, Valve Spring

KENT-MOORE ORG. INC.
28635 Mound Road
Warren, Michigan
P. A. STURTEVANT CO.
Addison, Ill.

Testing For Cracks

See also "Injection for Cracks";
MAGNAFLUX CORPORATION
7300 West Lawrence Ave.
Chicago 31, Illinois

Testing For Leaks

MAGNAFLUX CORPORATION
7300 West Lawrence Ave.
Chicago 31, Illinois

Testing Instruments, Electrical

KENT-MOORE ORG. INC.
28635 Mound Road
Warren, Michigan
KISTLER INSTRUMENT CORP.
15 Webster Street
North Tonawanda, N. Y.
SIMPSON ELECTRIC CO.
5200 W. Kinzie St.
Chicago 44, Ill.

Testing Instruments, Oil

See also "Oil Testing Equipment";
THE GERIN CORPORATION
Avon, N. J.
LENGOR, INC.
Townsworth Bldg.
Annapolis, Md.

Thermometers

See "Gages, Temperature"
DIESEL PLANT SPECIALTIES CO.
Stevens Point, Wisconsin
ROCHESTER MFG. CO., INC.
Rockwood St.
Rochester 10, New York

Thermometers, Dial Indicating

BACHARACH INDUSTRIAL INSTRUMENT CO.
200 North Braddock Avenue
Pittsburgh 8, Pennsylvania
ROCHESTER MFG. CO., INC.
Rockwood St.
Rochester 10, New York
SIMPSON ELECTRIC CO.
5200 W. Kinzie St.
Chicago 44, Ill.

Thermometers, Dial Indicating, Distance Type

ROCHESTER MFG. CO., INC.
Rockwood St.
Rochester 10, New York

Thermometers, Flue Gas

BACHARACH INDUSTRIAL INSTRUMENT CO.
200 North Braddock Avenue
Pittsburgh 8, Pennsylvania
ROCHESTER MFG. CO., INC.
Rockwood St.
Rochester 10, N. Y.

Thermometers, Indicating

BACHARACH INDUSTRIAL INSTRUMENT CO.
200 North Braddock Avenue
Pittsburgh 8, Pennsylvania
ROCHESTER MFG. CO., INC.
Rockwood St.
Rochester 10, New York

Thermometers, Portable Recording

BACHARACH INDUSTRIAL INSTRUMENT CO.
200 North Braddock Avenue
Pittsburgh 8, Pennsylvania

Timing Chains

See also "Chains Timing";
DIAMOND CHAIN CO., INC.
402 Kentucky Ave.
Indianapolis 7, Ind.

Tools, Diesel Engine Service

BACHARACH INDUSTRIAL INSTRUMENT CO.
200 N. Braddock Ave.
Pittsburgh 8, Pa.
KENT-MOORE ORGANIZATION, INC.
28635 Mound Rd., Warren, Mich.
SNAP-ON TOOLS CORP.
Kenosha, Wisconsin
TOBIN-ARP MFG. COMPANY
6400 Pennsylvania Ave., So.
Minneapolis, Minnesota

Tools, Mechanic's Hand

PROTO TOOL CO. PENDLETON
DIV. OF TOOL INDUSTRIES, INC.
2209 Santa Fe Avenue
Los Angeles 54, California
SNAP-ON TOOLS CORP.
Kenosha, Wis.

Torque Converter Coolers

YOUNG RADIATOR COMPANY
709 South Marquette St.
Racine, Wisc.

Torque Converters

See also "Converters, Torque";

CLARK EQUIPMENT CO.
Buchanan & Jackson, Mich.
TWIN DISC CLUTCH CO.
1328 Racine St.
Racine, Wisc.

Torque Converter Transmission Combinations

TWIN DISC CLUTCH CO.
1328 Racine St.
Racine, Wisc.

Transmissions

BRAD FOOTE GEAR WORKS, INC.
1315 S. Cicero Ave.
Cicero 50, Ill.
CLARK EQUIPMENT CO.
Buchanan & Jackson, Mich.
ROCKFORD CLUTCH DIV.
BORG WARNER CORP.
1301 18th Ave.
Rockford, Ill.

Transmissions, Reversing

SNOW-NABSTEDT GEAR CORP.
251 Welton St.
Hamden, Conn.

Truck Cab Air Conditioners

KYSOR HEATER CO.
1100 W. Wright St.
Cadillac, Mich.

Tubing, Finned

THE ROME-TURNEY RADIATOR CO.
Rome, New York

Tubing, Flexible Metal

See heading above.

THE AMERICAN BRASS COMPANY
AMERICAN METAL HOSE DIVISION
698 S. Main Street
Waterbury 20, Conn.

Tubing, Flexible, Non-Metallic

See also "Flexible" headings;

THE AMERICAN BRASS COMPANY
AMERICAN METAL HOSE DIV.
698 S. Main St.
Waterbury 20, Conn.

Tubing, High Pressure

THE AMERICAN BRASS COMPANY
AMERICAN METAL HOSE DIV.
698 S. Main St.
Waterbury 20, Conn.
THE INTERNATIONAL NICKEL CO., INC.
67 Wall Street
New York 5, New York

Turbochargers

See also headings under "Blowers"; "Supercharging Blowers".

AIRESEARCH INDUSTRIAL DIV.
GARRETT CORP.
9225 Aviation Blvd.
Los Angeles 45, Calif.
ALCO PRODUCTS, INC.
30 Church St.
New York 8, N. Y.
BROWN BOVERI CORPORATION
19 Rector Street
New York 6, New York
DE LAVAL STEAM TURBINE CO.
Trenton 2, N. J.
ELLIOTT COMPANY
Jeannette, Penna.
ENGINEERING CO., LTD.
Dr. Alfred J. Buchi
Winterthur, Switzerland
MIEHLE-DEXTER SUPERCHARGER DIV.
100 Fourth
Racine, Wisc.
SCHWITZER CORP.
1125 Massachusetts Avenue
Indianapolis 7, Indiana
THOMPSON PRODUCTS, INC.
JET DIVISION
23555 Euclid Avenue
Cleveland 17, Ohio

Unit Injectors, Fuel Oil

ALLYN MFG. CO.
1758 West Wellington Ave.
Chicago 13, Illinois
AMERICAN BOSCH DIV.
AMERICAN BOSCH ARMA CORP.
3664 Main Street
Springfield 7, Mass.
HANCOCK DIESEL SERVICE CO.
300 Walnut Street
Findlay, Ohio
SCINTILLA DIVISION
BENDIX AVIATION CORP.
Sherman Ave.
Sidney, New York

Valve Guides

ALLYN MFG. CO.
1758 West Wellington Ave.
Chicago 13, Illinois
HARTFORD MACHINE SCREW CO.
Box 1440
Hartford 2, Conn.
KENT-MOORE ORG. INC.
28635 Mound Road
Warren, Michigan

Valve Plates, Non-Metallic

C. LEE COOK CO.
916 S. 8th St.
Louisville 3, Ky.

Valve Regrinders

ALBERTSON & CO., INC.
Sioux City, Iowa
ALLYN MFG. CO.
1758 West Wellington Ave.
Chicago 13, Illinois
HALL-TOLEDO, INC.
2931 South Ave.
Toledo 9, Ohio
SNAP-ON TOOLS CORP.
8064 28th Avenue
Kenosha, Wisconsin
TOBIN-ARP MFG. CO.
6400 Penn. Ave. South
Minneapolis, Minnesota
VAN NORMAN AUTOMOTIVE
EQUIPMENT COMPANY
3640 Main Street
Springfield 7, Mass.

Valve Seat Grinders

See also "Grinders";

ALBERTSON & CO., INC.
Sioux City, Iowa
HALL-TOLEDO, INC.
2931 South Ave.
Toledo 9, Ohio
KENT-MOORE ORG. INC.
28635 Mound Road
Warren, Michigan
SNAP-ON TOOLS CORP.
8064 28th Avenue
Kenosha, Wisconsin

Valve Seat Inserts

ALBERTSON & CO., INC.
Sioux City, Iowa
EATON MANUFACTURING CO.
VALVE DIV.
9771 French Rd.
Detroit 13, Mich.
MARTIN WELLS
5886 Compton Avenue
Los Angeles 1, Calif.
PETERSON MACHINE TOOL, INC.
6200 Merriam Drive
Merriam, Kansas

Valve Seat Inserters

HALL-TOLEDO, INC.
2931 South Ave.
Toledo 9, Ohio

Valve Tappets

THE CHICAGO SCREW COMPANY
DIV. OF STANDARD SCREW CO.
2701 Washington Blvd.
Bellwood, Illinois
EATON MANUFACTURING CO.
VALVE DIV.
739 East 140th Street
Cleveland 10, Ohio

Valves, Engine

EATON MANUFACTURING CO.
VALVE DIV.
739 East 140th Street
Cleveland 10, Ohio

Valves, Engine Indicator

BACHARACH INDUSTRIAL INSTRUMENT
200 North Braddock Ave.
Pittsburgh 8, Penn.
KIENE DIESEL ACCESSORIES INC.
10352 Pacific Ave.
Franklin Park, Illinois

Valves, Packless

ROBERTSHAW-FULTON CONTROLS CO.
FULTON-SYLPHON DIVISION
P. O. Box 400
Knoxville 1, Tenn.

Valves, Sight-Feed

WM. W. NUGENT & CO., INC.
3426 Cleveland St.
Skokie, Ill.

Valves, Thermostatic

AMOT CONTROLS CORP.
1st St. & Nevin Ave., P. O. Box 1707
Richmond, Calif.
THE POWERS REGULATOR COMPANY
3400 Oakton Street
Skokie, Illinois

Valves, Three-Way

THE POWERS REGULATOR CO.
3400 Oakton St.
Skokie, Ill.

Variable Speed Drives

LOVEJOY FLEXIBLE COUPLING CO.
4866 W. Lake St.
Chicago 44, Ill.

Vessels, Pressure

ALCO PRODUCTS, INC.
30 Church St.
New York 8, N. Y.
AMERICAN M-A-N CORP.
149 Broadway
New York 6, N. Y.
THE WHITLOCK MFG. CO.
West Hartford 10, Conn.

Vibration Control
HOUDAILLE INDUSTRIES, INC.
BUFFALO HYDRAULICS DIV.
537 East Delavan Ave.
Buffalo 11, N. Y.

Vibration Eliminators
THE AMERICAN BRASS COMPANY
AMERICAN METAL HOSE DIVISION
698 South Main Street
Waterbury 20, Connecticut

Viscosity Indicating Devices
THE GERIN CORPORATION
Avon, New Jersey

Volt-Ammeters, Clamp-on Type
See also "Ammeters, Tong Test Type";
COLUMBIA ELECTRIC MFG. CO.
4537 Hamilton Ave.
Cleveland 14, Ohio
ROCHESTER MFG. CO., INC.
34 Rockwood Street
Rochester 10, N. Y.

Voltage Regulators
See also "Regulators, Current and Voltage";
BROWN BOVERI CORPORATION
19 Rector Street
New York 6, N. Y.
THE ELECTRIC AUTO-LITE COMPANY
Champlain Street
Toledo 1, Ohio

Washers
CLEVELAND GRAPHITE BRONZE CO.
DIV. OF CLEVITE CORP.
17000 St. Clair Ave.
Cleveland 10, Ohio
HARTFORD MACHINE SCREW CO.
Box 1440
Hartford 2, Conn.

Waste Heat Boilers
DAVIS ENGINEERING CORP.
30 Rockefeller Plaza
New York 20, N. Y.
THE WHITLOCK MFG. CO.
West Hartford 10, Conn.

Water Cooling Equipment
See also "Cooler" headings;
DAVIS ENGINEERING CORP.
30 Rockefeller Plaza
New York 20, N. Y.
THE WHITLOCK MFG. CO.
West Hartford 10, Conn.
YOUNG RADIATOR COMPANY
709 Marquette St.
Racine, Wisconsin

Water Heaters, Waste Heat
THE WHITLOCK MFG. CO.
West Hartford 10, Conn.

Water Separators & Filters, Mechanical
See also "Separator" listings;
De LAVAL SEPARATOR CO.
25 Columbia St.
Poughkeepsie, N. Y.

Water Softeners
R. M. HOLLINGSHEAD CORP.
PERRY FILTER DIVISION
840 Cooper Street
Camden 2, New Jersey

Welding, Diesel Parts
RALPH STARK, INC.
43-12 3rd St.
Long Island City 1, N. Y.

Weldments
ALCO PRODUCTS, INC.
30 Church St.
New York 8, N. Y.
BALDWIN-LIMA-HAMILTON CORP.
545 North 3rd Street
Hamilton, Ohio
THE INTERNATIONAL NICKEL CO.
67 Wall Street
New York 5, N. Y.

Windshield Wipers, Electric
AMERICAN BOSCH DIV.
AMERICAN BOSCH ARMA CORP.
3664 Main Street
Springfield 7, Mass.

Worm Gears
BRAD FOOTE GEAR WORKS
1315 So. Cicero Avenue
Cicero 50, Illinois

Wrenches
See also "Tools".
KENT-MOORE ORG. INC.
28635 Mound Road
Warren, Michigan
SNAP-ON TOOLS CORP.
8064 28th Avenue
Kenosha, Wisconsin

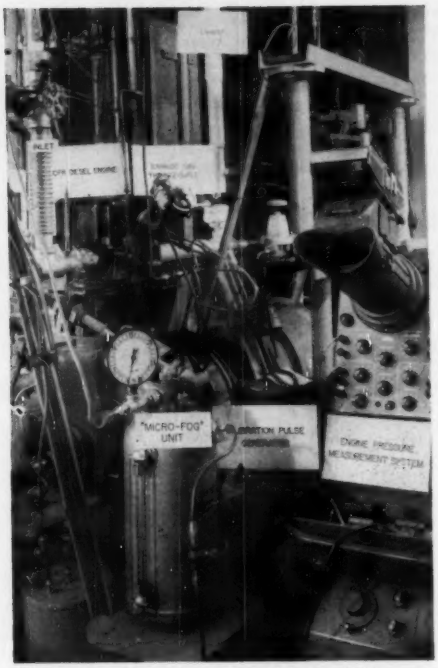
Wrenches, Box, Open End
SNAP-ON TOOLS CORP.
8064 28th Avenue
Kenosha, Wisconsin

Wrenches, Socket
HARTFORD MACHINE SCREW CO.
Box 1440
Hartford 2, Conn.
SNAP-ON TOOLS CORP.
8064 28th Avenue
Kenosha, Wisconsin

Wrenches, Torque
KENT-MOORE ORGANIZATION INC.
28635 Mound Rd.
Warren, Mich.
SNAP-ON TOOLS CORP.
8064 28th Avenue
Kenosha, Wisconsin
P. A. STURTEVANT COMPANY
Addison, Illinois

Wrist Pin Bushing Boring Fixtures
KENT-MOORE ORGANIZATION, INC.
28635 Mound Rd.
Warren, Mich.

Please Say You Saw It In DIESEL POWER



Fumigation test setup at Penn State U. A Norgren Micro-Fog unit is inducting fuel mist into CFR diesel.

"Fumigation"— A Potential Fuel Saver

By C. W. Kinnear

Introduction of a part of fuel in mist form, the rest by injection, shows advantages in laboratory and preliminary railroad tests.

IMPROVED fuel economy plus other benefits are promised by a new process of "fumigation". A portion of the fuel charge is introduced in the engine's intake manifold in the form of a fine mist that mixes readily with the intake air.

Some effects of this introduction of fuel as a micro-mist, into an engine's intake air include: lower fuel consumption, less smoke, shorter ignition lag, lower rate of cylinder pressure rise, smoother and more quiet engine operation, and satisfactory burning of wider range of fuels in high-speed engines. These major benefits, as well as the diesel fumigation tests conducted at Pennsylvania State University, were discussed in an SAE paper by Schweitzer, Alperstein and Swim, all of Penn State.

When about 15% of a normal charge of regular fuel is finely atomized and enters the cylinder through the air intake manifold, it, without igniting, causes cylinder temperature and pressure to rise. When the main fuel charge is injected, it ignites much quicker than if the whole fuel charge were injected at one time. Under these conditions, even a poor fuel reacts more rapidly with oxygen to produce faster and more complete combustion.

These results of two years of research sponsored by the Navy's Bureau of Ships and conducted by Dr. Schweitzer, were so encouraging, that Pennsylvania RR has initiated a development program to find means of applying fumigation to locomotive diesels.

Maximum fumigation benefits were obtained at Penn State when inducting fuel in a micro-mist (not over 4 microns) from a Norgren micro-fog generator. However, this device is not practical for use on large locomotive diesels. Improved performance was obtained by use of spray nozzles using compressed air. This equipment produces in volume, a spray with average mass droplets of about 52.5 microns.

A 12-cyl Alco Model 244 engine has been prepared by the PRR for tests to be conducted on a test block. Later it will be tested on the road after suitable apparatus has been developed. So far, only basic engine tests have been conducted and bench tests made for selection of fumigation nozzles. In cooperation with Dr. Schweitzer, the PRR intends to develop adequate spray nozzles that will produce a very fine mist.

Spray nozzles will not give the 9% specific fuel consumption reduction obtained when using micro-fog fuel mist fumigation in Penn State's CFR engine. However, it is hoped that about a 5% reduction in fuel consumed at or near full load will be realized with spray nozzles. Also, the PRR believes that fuels of 25 cetane could be used under all operating conditions providing that fumigation of a fuel treated with a cetane improver was applied at idle and low loads.

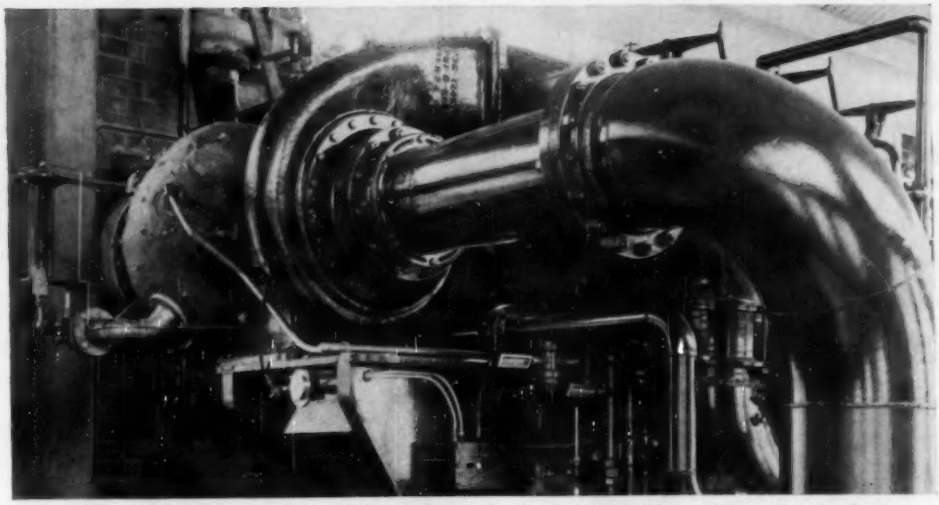
Two schemes for investigating effects of fumigation of road diesels by the PRR are:

(1) To continue using minimum 40 cetane fuels at loads below 80%. At loads above 80%, fumigate with same oil from locomotive fuel tank.

(2) To use a low-cetane fuel (25 minimum) as main supply in the unit's fuel tank, and (a) fumigate with this fuel at loads above 80%, and (b) fumigate with a mixture of 97½% high-cetane fuel and 2½% amyl nitrate at idle and low loads.

Both schemes offer attractive net annual savings if 5% less fuel can be used. Scheme 2 offers a much greater net savings if lower grade fuels costing ¾ cents less per gallon can be used. The 1000 units in road service on the PRR use about 205-million gallons of diesel fuel per year. Of this total, about 57% is used when engines work in the 7th and 8th throttle positions. A 5% reduction in fuel burned in these positions would amount to about 5,840,000 gallons—quite a saving.

As to the other advantages gained from fumigation, increased power output is not anticipated from railroad diesels because of capacity limitations in electrical drive used. Reduction in maximum rate of pressure rise may reduce shock loading on bearings, thus lessening bearing failure problems now experienced on some engines.



Clark HBA gas engine-compressor uses Clark turbocharger. Smaller Clark MA-8 unit uses AiResearch turbo (See June issue). Scavenging air-controlled motor valve (left) bypasses any excess exhaust gas to limit the turbine speed. Tachometer (under blower) checks turbine speed. Line to turbine shaft carries cool scavenging air for cooling.

Need More Power? — Convert By Turbocharging

By C. E. Gotterba
General Supt. Gas Division, Richfield Oil Corp.

Field turbocharging of gas-engine compressors has been proven practical by Richfield Oil Corp. engineers. AiResearch and Clark turbochargers were applied to different engine-compressor models. Careful engineering during installation yielded the predicted performance boost. Modified maintenance procedures will continue to keep this new performance high.

Part II

In Part I of this article, Mr. Gotterba discussed how existing gas engine compressors have been economically turbocharged in the field. He covered the factors which control the maximum amount an engine-compressor unit should be turbocharged and its output boosted. He also discussed the modifications necessary to make the field conversion. Now, in Mr. Gotterba's own words, let us continue with the ———

Maintenance of Units After Turbocharging

Our maintenance schedule for the converted gas engine-compressors is divided into two parts. One deals with the changes in routine maintenance of the engine due to turbocharging. The other concentrates on maintenance of the turbocharger itself.

Our personnel has been instructed in both phases but only the latter will be emphasized. Since the units have been in operation, only one hot wheel and bearings had to be replaced. Because detailed maintenance procedures for each of our engines would be repetitious, only the Clark MA-8 previously discussed will be covered. With slight exceptions, this is typical of maintenance on our other units.

As a basis for future comparison and for diagnosing troubles, the units were tested immediately after conversion and all data recorded. This data included measurements of air and water flow, pressure, temperatures, etc. To get some of this data, special devices were needed. For example, for the Clark MA-8 engine, Garrett Corp. supplied a calibrated bell-shaped flow nozzle for measurement of air flow in each turbocharger.

In addition, complete operating data, maintenance data on inspection periods, clearances, etc, must be recorded. Here are some of the manufacturer's recommendations as well as our own (based on experience), covering spare parts inventory, inspection periods and maintenance.

Maintenance Of Turbocharger

Spare parts inventory has increased only slightly in number but much in cost due to turbocharging. Sufficient spares must be kept in stock since our operations demand an absolute minimum of downtime. For the largest unit we stock a rotating assembly. This includes turbine and compressor wheels, shafts, bearings and seals. Small assemblies are available locally. Savings in downtime possible through stocking of these spares more than pays for the extra cost of a larger inventory.

Turbocharger bearings should be checked for wear every 5000 to 10,000 hours of operation. This period may be lengthened in the future depending on rate of wear and bearing condition found. Clearance data for these bearings, both new and worn, and for required shaft end play come with the individual turbo kit.

Turbine and compressor wheels should be cleaned every 10,000 hours of operation. Under severe operating conditions or if a noticeable change in performance has occurred, it may be done sooner. To determine if turbo air capacity is being impaired by dirt on the compressor wheel or combustion deposits on the turbine wheel, check its rpm, amount of vibration and compare air pressures and flow with the original data recorded.

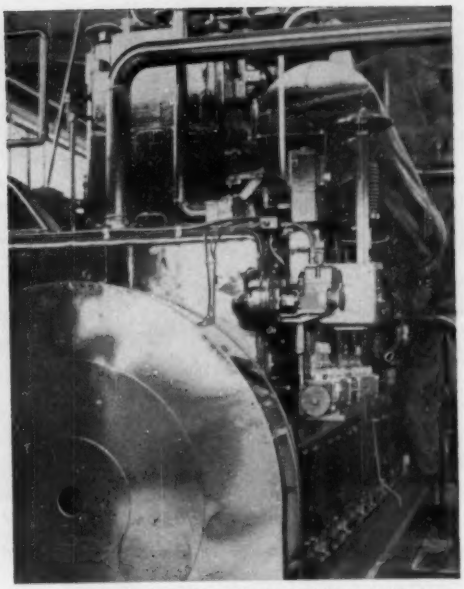
Rotating assemblies should be cleaned thoroughly. Incomplete cleaning can cause a wheel to be more out of balance than if it were left untouched. Never scrape or chip deposits from the turbine and compressor wheels. A good industrial cleaner should be used. Marks or scratches on either wheel should be smoothed carefully and the wheel rebalanced. One quick check for cracked turbine wheels is tapping. A solid blade gives a clear ring. A cracked one sounds dull. All turbo seals should be inspected.

Lube oil for the turbo is taken from the engine system on our installations. Since engine and turbo bearing lubrication is very critical, manufacturer's recommendations on oil flow rates and temperatures must be followed. As previously mentioned, separate high-efficiency full-flow filters of proper capacity are used to keep the engine oil clean for aluminum bearings and to protect the turbocharger bearings.

Safety devices for controlling turbine overspeed must be inspected at the same time as other turbo components since there are several conditions that could cause a turbine to runaway.

Intercooler inspection is based on heat transfer data obtained during original testing of the engine. When excessive fouling ocurs, the exchanger should be cleaned. This check for efficiency should be made at least every 10,000 hours of operation. At the same time, a hydrostatic leak test should be made on water-cooled units. When such units are used, the water should be treated to prevent scale and corrosion. Cooling water temperature rise should be kept between 20°F to 25°F.

Air filter inspection periods will depend on existing conditions at the operating site. A dusty or foggy atmosphere means more frequent filter cleaning. Pressure drop through the filters must not exceed 2-in. of water. A greater drop means restricted air flow through the filter and lower turbo efficiency. This condition is made worse in cold weather when water content of the atmosphere is high. Ice forms in the filtering element further restricting flow.



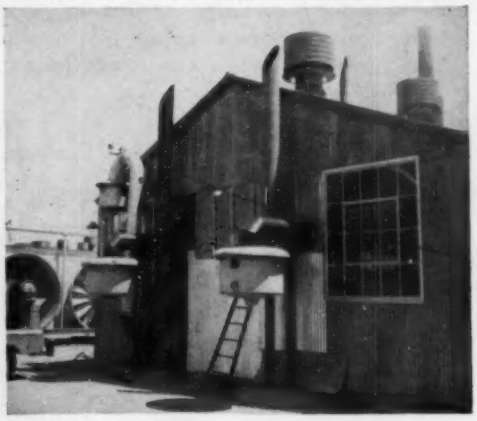
View from flywheel end of turbocharged Clark HBA shows: dry exhaust manifold (top right); Clark automatic spark advance and retard device (above lubricators); one of two low-tension magnetos (left of this device); and governor.

Air ducting needs little maintenance if properly designed and installed. When the turbocharger is inspected, inspect the ducting too. Clean any dirt or oil found.

The stainless steel screen in the exhaust manifold to the turbo inlet must also be inspected at this time. These are used to protect the turbo blades. Should pieces of fuel injection valves, piston rings, air starting valves, etc., break off and hit the turbine wheel, it would be seriously damaged. Since this can happen, during overhauls

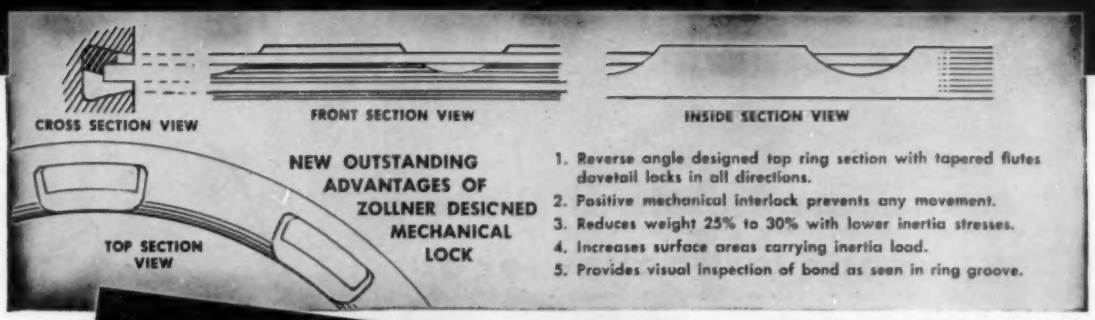
(*Continued on Page 77*)

Two MA-8 Clark units turbocharged by AiResearch turbochargers are housed here. Vortox filters are connected to air intakes. As seen, no mufflers are needed on exhaust lines. Industrial Engineering forced-draft radiators are also seen.



BOND-O-LOC* PISTONS

WITH "NI-RESIST" IRON TOP RING SECTION


CROSS SECTION VIEW
FRONT SECTION VIEW
INSIDE SECTION VIEW
TOP SECTION VIEW
NEW OUTSTANDING ADVANTAGES OF ZOLLNER DESIGNED MECHANICAL LOCK
1. Reverse angle designed top ring section with tapered flutes dovetail locks in all directions.
2. Positive mechanical interlock prevents any movement.
3. Reduces weight 25% to 30% with lower inertia stresses.
4. Increases surface areas carrying inertia load.
5. Provides visual inspection of bond as seen in ring groove.

Double Bonded
METALLURGICALLY Al-Fin Bond
MECHANICALLY Zollner Lock

STOPS!

RING GROOVE WEAR IN HEAVY DUTY SERVICE

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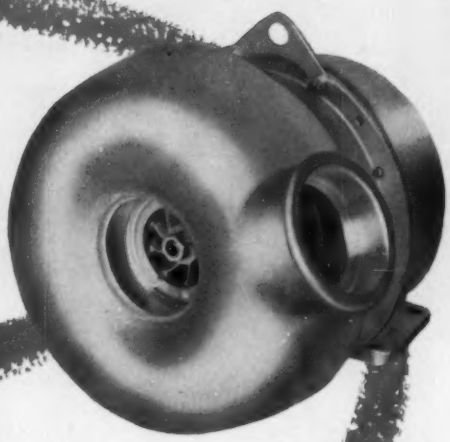
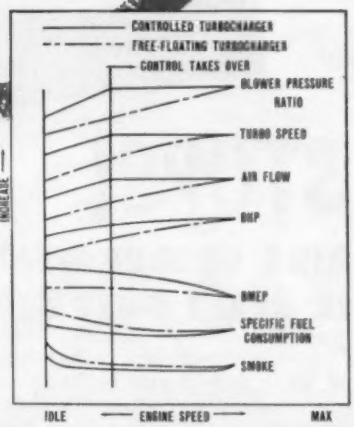


AiResearch control system keeps turbocharger output at ideal level



Improved performance characteristics of a typical turbocharged diesel engine equipped with the new AiResearch Turbocharger Control System.

Accurate control of turbocharger speed over its complete range regardless of changing load characteristics has been achieved with the new AiResearch Turbocharger Control System. This automatic control system delivers more air to the engine when needed and greatly increases torque rise, giving turbocharged diesel engines greater lugging ability when operating under heavy loads. By contrast, free-floating turbochargers operate at reduced RPM when the engine is working at below-maximum engine speed.

This improved air delivery system greatly increases the acceleration, for example, of turbocharged diesel trucks up steep grades. In a typical case, the round-trip time of a trucking company operating between Phoenix and Denver was cut from 48 hours to 42 hours. Over short hauls an off-the-road truck cut its 27-minute round-trip time to 18 minutes. Comparable gains are made for all types of turbocharged diesel equipment, stationary or mobile.

The two components of the new control system are a pressure ratio sensor and an exhaust by-pass valve. They control the speed of exhaust-driven turbochargers by modulating the amount of engine exhaust used. This eliminates overspeeding of the turboblower, and at the same time provides higher turboblower speed while lugging. Smoking is virtually eliminated under all conditions.

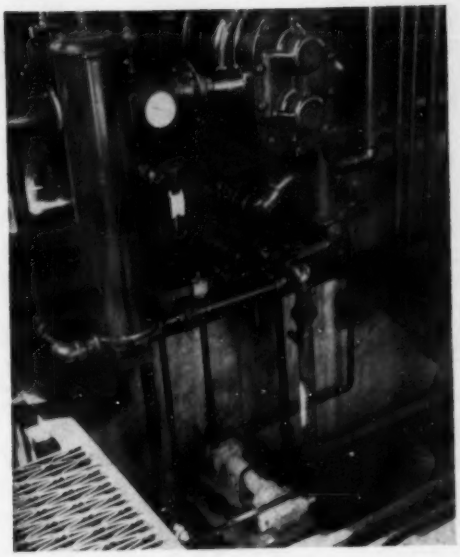
Your inquiries are invited.

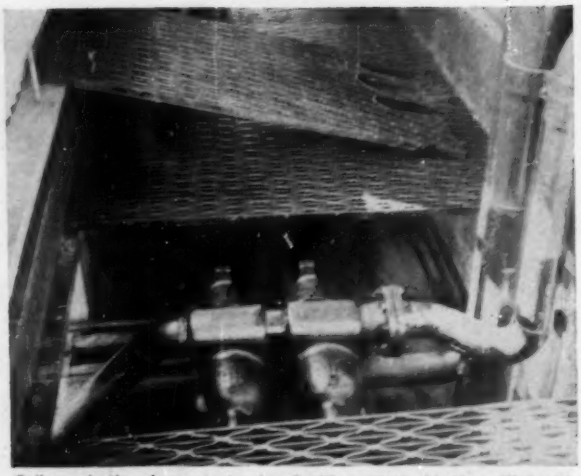
THE GARRETT CORPORATION

AiResearch Industrial Division

9225 South Aviation Blvd., Los Angeles 45, California

DESIGNERS AND MANUFACTURERS OF TURBOCHARGERS AND SPECIALIZED INDUSTRIAL PRODUCTS





Gallco pulsation dampners (equipped with synthetic bladders filled with inert gas) in the lube oil lines prevent high-frequency vibration.

Air motor-driven Roper pre-lubricating pump (below floor plates) is used on aluminum bearing-equipped turbocharged Clark engine.

(*Continued from Page 74*)

it pays to magniflux all engine parts that are potential offenders.

General Engine Maintenance

Full evaluation of the effect turbocharging has on engine maintenance has not yet been made because our units have been in operation only a year since converting them. However, lube oil, cylinder ports and piston ring conditions indicate that normal engine overhaul periods may be extended from 12 to 24 months.

Indications also show however, some engine inspections must be made more frequently because of turbocharging. Due to the greater output and consequent higher cylinder pressures, individual cylinder loads on these engines must be very accurately balanced. This must be done at least every 30 days. Good results have been obtained by checking with a pressure indicator and taking indicator pull-cards.

We find that turbocharging our gas engines cuts spark plug life about in half because of the higher temperatures and pressures involved. For that reason all engines are equipped with dual ignition. If one spark plug fails, we replace all of them as we have always done in the past. We have extended spark plug life considerably by changing to another type more suitable to the engine and load conditions and with proper polarity to the plugs. But even in these cases spark plug life is shorter than on non-turbocharged engines. We're hoping to reach the former life through more experimentation and development.

No piston ring problems have showed up so far. In the Clark MA-8, engineered piston rings were used. On another Clark model, original equipment rings were used. Both types are operating satisfactorily.

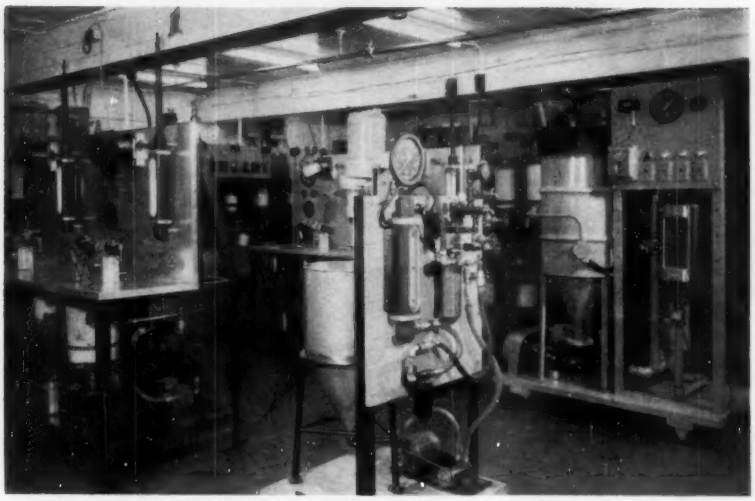
Engine starting and loading procedures of turbocharged gas engines are about the same as for naturally-aspirated units. However, the precautions taken when starting a gas engine should be followed more closely when it's turbocharged. If the engine fails to fire, gas should be cut off and the engine purged before attempting to start again. Failure to do this may result in explosions in the exhaust manifold or turbine.

Cost of maintenance on all our units has not been completely determined. However, it is estimated that total cost of maintaining the converted units will be about 10% higher than before turbocharging. Yet even with this increase, cost per delivered horsepower is less than before turbocharging.

Summary

Existing gas engine-compressors can be and have been successfully and economically turbocharged in the field. To do this, first base the percentage of engine output gained by turbocharging on the potential compressor capacity. Then make sure that both the engine and compressor can stand the resulting increased pressures and temperatures without excessive maintenance, frequent breakdowns and costly operation. Consult the engine and compressor builders to confirm your calculations. Get complete conversion, operating and maintenance data from them if your engineers are not experienced in design of installations.

When making the conversion, do it according to manufacturer's recommendations. After converting, follow closely a good preventive maintenance schedule. If this is done, the cost per delivered horsepower can be less than that before turbocharging. This has been our experience at Richfield Oil and we're satisfied.



Laboratory equipment used at the Wix Corp. to evaluate filtrant performance.

Performance Testing Demonstrates Differences in Fuel Filters

By James Wilson and Ralph Young,
Engineering Dept., Wix Corporation

Report on tests conducted to find a filtrant and element design to meet the multiple requirements of fine filtration, adequate flow rate and satisfactory service life.

FOR those who have wrestled with troubles caused by contaminants in diesel fuel, results of a study recently completed by a research team in Wix Corporation, Gastonia, N. C., will be a welcome contribution to improved diesel operation. This study was aimed to develop a filtering medium to: (1) remove even minute contaminants from the oil over a longer period of time than conventional filtrants, and (2) maintain high flow-rate characteristics throughout the life cycle of the filtrant.

It should be explained at the outset that ability to capture contaminants is important only if, at the same time, flow rate remains high, because starvation of the fuel pump cannot be tolerated. High filtering efficiency with impaired flow rate must be avoided at all costs and, conversely, high flow rate that is maintained at the expense of filtering efficiency is equally undesirable. Thus, the problem is a threefold one combining improved retention of contaminants, sustained flow and prolonged service life.

The study was planned to give a comprehensive picture, including representative types of filtrants currently used in diesel engine filters. These include: Filter "A"—a standard 2nd-stage fuel filter cartridge; Filter "R"—a rayon

(*Continued on Page* 81)

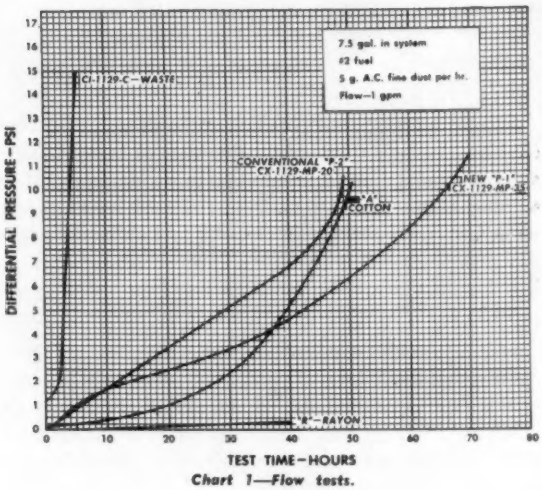


Chart 1—Flow tests.

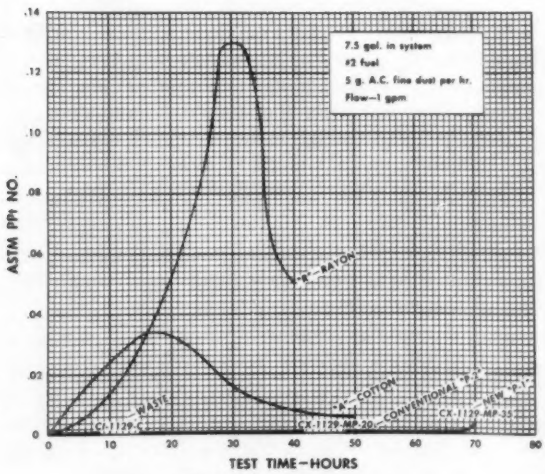


Chart 2—Filtration tests.

Why Lower-Groove Compression Rings Need Supplementary Pressure

Pedrick Formflex Seal-Cut Conformable Compression Ring

The force or pressure of the compression and combustion gases back of the rings is one of the most important factors in keeping the compression rings pressing against the cylinder walls for a satisfactory seal. The tension built into the ring contributes to this, but in a relatively minor way.

The top compression ring enjoys the greatest assist from combustion-chamber pressures. The gas pressure available to the second ring is only what passes through the top-ring gap, and is substantially less than cylinder pressure. The pressure behind the 3rd ring is still further reduced. Thus, by the time the gas pressures reach the lowest compression ring usually there is not sufficient force to enable the ring to maintain a seal, and it is here that it is most important to maintain a seal to prevent the gases from going further.

The ring used in the lowest compression groove needs special assistance to do its job. This is provided in the Pedrick FORMFLEX Seal-Cut compression ring. It is a single cast-iron ring of much less radial thickness for greater conformability and response to pressures. Its special-design of overlapping ends close the gap completely. Its big assistance comes from the Pedrick "Equalizer" which backs it up and provides adequate additional outward pressure to seal at the cylinder wall and stop blowby. This pressure is exerted everywhere around the ring and is absolutely uniform.

The result is a ring conformable enough to follow cylinder-wall irregularities and with enough pressure to maintain an effective seal. Power is preserved. Contamination of the lubrication oil from blowby gases is avoided. There is no build-up of undesirable and potentially-dangerous gas pressures in the crankcase.

Why not get the full benefit of Pedrick's experience in the design and application of conformable compression, as well as conformable oil rings, to your big diesel and natural-gas engines? For engineering details on the application of conformable compression rings, write for Form 434. WILKENING MANUFACTURING CO., Philadelphia 42, Pa. In Canada: Wilkening Manufacturing Co. (Canada) Ltd., Toronto 2.

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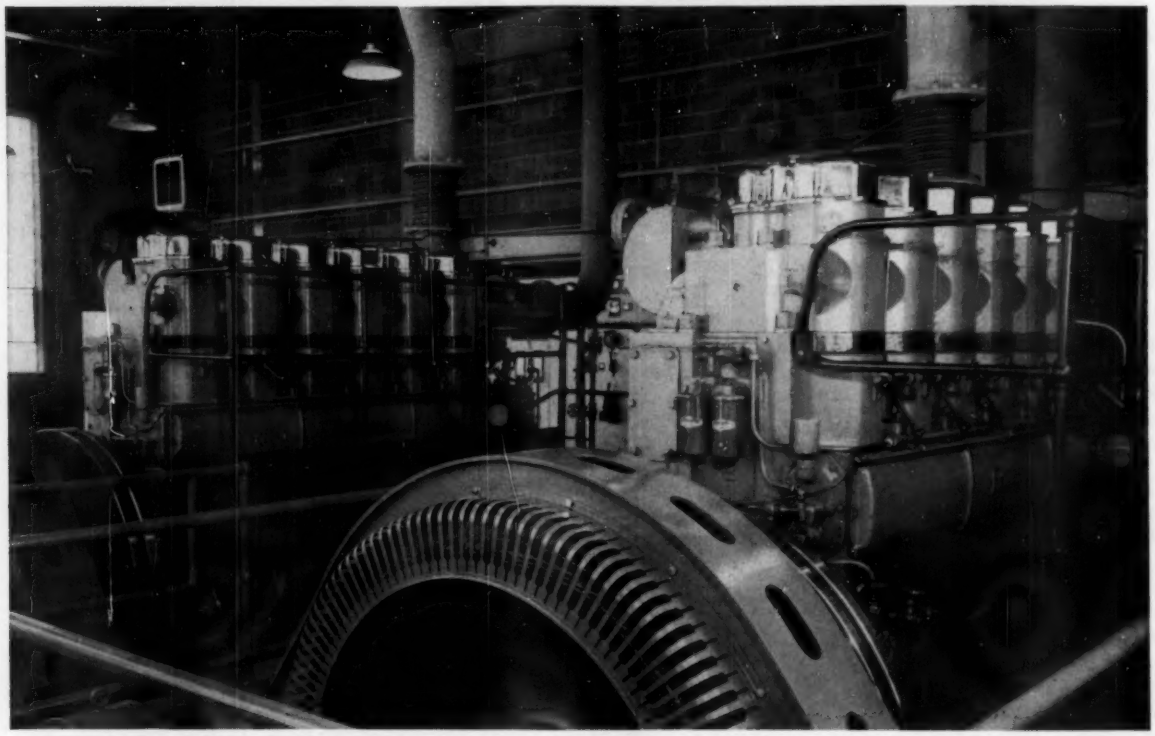
- ✓ ***A record of very low maintenance cost!***
- ✓ ***Exceptionally good fuel and lube oil economy!"***

Clifford Severson

Manager, Municipal Power Plant,
City of Barnesville, Minn.



Two Turbocharged Enterprise Diesels, with a combined capacity of 970 KW, provide Barnesville with all its electrical requirements.

An enthusiastic booster of Enterprise Engines, Cliff Severson rates his 6 year old power plant at just about perfect. On every point of service and operating performance, Mr. Severson points with pride to cost figures that would be the envy of any economy-minded power plant operator, municipal engineer or city official.

Enterprise specializes in engines for stationary and portable electric power generation, flood and water pumping systems, and sewage plant power. Versatile fueling is available in diesel, dual fuel and spark ignited gas engines. Models range from 73 to 7703 HP. Call the Enterprise sales engineer in your area, or contact factory for information or help with your plans.

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(*Continued from Page 78*)

cartridge of the same construction as "A"; Filter "C"—a cotton waste replacement; Filter "P-2"—a conventional pleated paper fuel filter cartridge; and "P-1"—the newly-developed pleated paper fuel cartridge.

Charts presented here graphically illustrate variables in performance between the five filtrants tested and the importance of co-relating flow and cleanliness.

Identical test procedures were precisely controlled, using 7.5 gallons of clean No. 2 fuel oil with constant flow of 1 gpm, and every hour of the test, 5 grams of AC fine dust (recognized fuel test contaminant) were added to the system. Hourly readings of pressure differential across the filter oil (ASTM precipitation number), were recorded and plotted to develop the curves shown in Charts I and II. Condemnation limits were based on differential pressure rise to 10 psi (an indication of flow reduction), and increases in the contamination level in the system (ASTM precipitation number).

Now refer to Charts I and II. Filter "A", used as the standard of performance, shows a test life of 50 hours before exceeding condemnation points for impaired flow or contamination.

Filter "R" maintained a continuing high flow rate but rapidly exceeded safe limits of contamination. Its erratic performance, insofar as filtration ability is indicated, showed it had very questionable value as a filtering medium and test was discontinued at 40 hours.

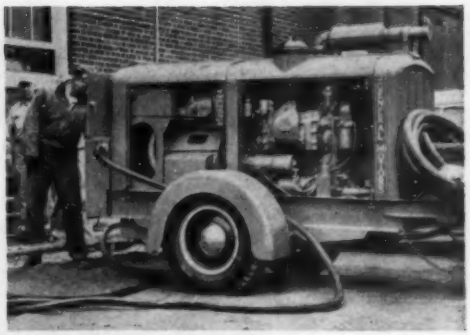
Filter cartridge "C" (cotton waste) demonstrated exceptionally high filtration ability . . . the contamination level never exceeding "trace amounts". However, this filtrant exceeded the flow rate condemnation figure at only 5 hours.

Comparison of these three filtrants exposes very clearly the extremes to be found in filter performance . . . "R" with unimpaired flow rate but questionable filtering ability . . . "C" with exceptional contamination retention and accelerated drop in flow rate.

Comparative performance of the two pleated filters is especially interesting. Both show outstanding ability to remove contaminants (Chart II) and in this respect their curves overlay one another, with no appreciable rise until 70 hours. Differential pressure, on the other hand, describes dramatic variations in performance (Chart I). P-2 (the standard paper) exhibited a uniform pressure rise to 45 hours and then rose sharply.

P-1 (the new pleated filtrant) developed a much less steep curve and did not attain the critical 10 psi point until 65 hours of test, thus substantially improving upon the performance of the accepted standard and meeting the requirements of the research.

Field tests are now being conducted in railroad locomotives on the new P-1 filtrant. This is probably the most severe test area in which accurate determinations can be obtained, and it is felt that results will closely parallel anticipated performance on mobile equipment. Reports received to date confirm results obtained in the laboratory as to the removal of contaminants, improved flow rate and extended life.



Municipality Pre-Plans Mobile Generator Use for Maximum Utility

TRENTON, Mich., has safeguarded its resident's comfort and security in emergencies with diesel standby power. This is in line with the general trend among many cities, to insure power supply during disasters, to vital points such as pumping stations, hospitals, fire houses, etc. Sufficient units are generally purchased to meet all necessary emergency demands. These are arranged so that in time of disaster, all that has to be done is to plug them into the power system quickly.

Trenton's new 80-kw portable diesel generator set insures continued operation of electric lift pumps in the storm sewer system in the eastern half of the city under any conditions. Terrain features place the brunt of rainstorms almost 100% on the sewer system in this area.

Mounted on a 2-wheel trailer, the unit consists of a 4-cyl Detroit Diesel engine driving an 80-kw generator (100 kva at 0.8 pf, 60 cycle, 208/240 v). It is started by battery. A 12-hr fuel supply for full-load operation is carried in a 45-gal tank beneath the engine.

Tests demonstrated the speed and simplicity of hooking up the unit. It can be towed by any vehicle of ¾-ton capacity and up. It is connected to the load by two 75-ft cables with quick-fastening plugs. Power is available the instant cables are connected, the engine started and a 2-way switch is thrown from main line to standby power. Receptacles at pumping stations and city buildings further reduce connecting time.

Officials are also considering using this unit for emergency power for hospitals and communications. Special wiring is already installed in the public works building and administration building which houses both police and fire departments. Flood and spot lights are also being mounted on the unit for rescue work along their 4-mile river front.

Two Budd trains are seen side by side in the service station at the Boston engine terminal. All materials, hot and cold water, lube oil, fuel, etc., are handled by a series of 58 automatic hose reels. Nine automatic power cord reels handle inspection lamps. Building is 720 ft long.

Close up of automatic hose reels shows how they're spaced apart and how far the hose and nozzles hang from the overhead reels. Men can easily reach up and take hold of the nozzle.

Super Service Station Speeds Train Turnaround

Budd trains in the Boston & Maine RR Terminal are ready for the road in 20 minutes, refilled with fuel, water, lubricants and sand. Here's how non-revenue time is cut.

SIX-car, diesel-powered Budd trains of the Boston and Main RR are serviced in 20 minutes. In this short period, engine and drinking water, sand, fuel, and transmission and lube oil for the whole train are taken on. Assembly-line precision work at the Boston Engine Terminal new super-service station, makes this great reduction in train servicing time possible.

All materials are handled by 58 automatic hose reels located at proper intervals in a 720-ft building. A series of nine automatic power cord reels handle inspection lamps.

As each train enters the building on either of two parallel sets of tracks, crews move to assigned duties. From overhead reels, they unreel hose lines and fill tanks of each car with drinking water, treated engine water, fuel oil, and transmission and lube oil. The latter are heated to make them flow readily. When finished, each hose line reels itself back automatically above work area.

Other hose lines provide hot water for removing ice, snow or debris in the cars' undergear. Small sanding cars attached to a monorail, replenish sand boxes of each Budd car, from a 10-ton supply tank on the roof. While these operations are going on, operating devices are inspected in compliance with regulations.

After passing through this service area, the train either returns to service or runs through an automatic washing machine in an adjacent area.

The automatic hose reels and power cord reels which form the basis of the materials handling for the million-dollar filling station were engineered and made by Gleason Reel Corp., Mayville, Wis.

High capacity purification of residual diesel fuel is achieved on the newly-launched Great Lakes bulk carrier ALEXANDER T. WOOD with this team of WESTFALIA purifiers/clarifiers: Two SAOG-4016 Automatic De-Sludgers, and two OG-4016 Heavy Duty Clarifiers.

NOW: Widest Range of Automatic Residual Fuel Purifiers Offered in WESTFALIA's Expanded Automatic De-Sludger Line

New SAOG-5016 De-Sludger
Highest Capacity Automatic Oil Purifier

Use of low cost residual oils as fuel for diesel engines is growing by leaps and bounds. This trend has been accelerated by the development of *automatic* oil purifiers. WESTFALIA Automatic De-Sludgers are outstanding for their high efficiency, sturdy construction, economy of operation and ease of handling. With the addition of two new De-Sludger models, SAOG-5016 and SAOG-3016, the WESTFALIA Automatic De-Sludger line now offers the highest capacities available anywhere, as well as the widest range of capacities for both two-step and single-step operation.

Avoid costly "guess work" by selecting the proper WESTFALIA Automatic De-Sludger to suit your specific requirements. We are ready to help you plan your diesel fuel purifying operation. Write for details today.

EFFECTIVE CAPACITIES OF WESTFALIA AUTOMATIC DE-SLUDGERS
(gph at various viscosities)

Viscosity, SSU (100F)	Model SAOG-2016	Model SAOG-3016	Model SAOG-4016	Model SAOG-5016
Two-Step Operation*				
500	600	750	1000	1250
1700	475	575	775	1000
3300	400	500	650	850
5000	300	375	500	650
8000	250	300	375	500
One-Step Operation				
500	400	500	650	850
1700	300	375	500	650
3300	250	325	425	550
5000	200	250	325	425
8000	150	200	250	325
Clarifier Size for 2nd Step in 2-Step Operation	OG-2016	OG-4016	OG-4016	OG-8016

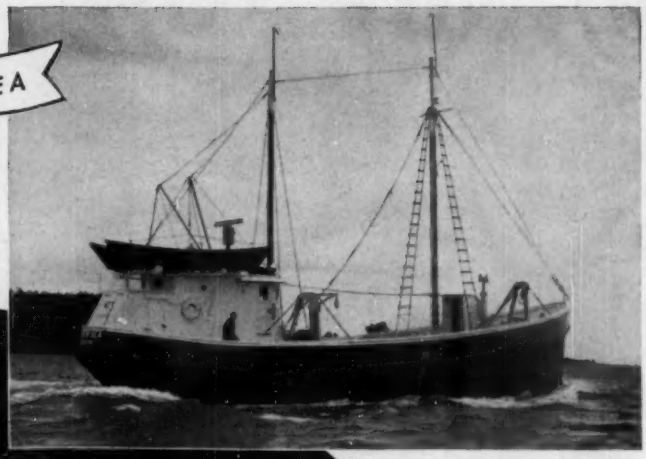
*First step: Purification by De-Sludger; second step: clarification by standard separator.

CENTRICO INC.
75 West Forest Avenue
Englewood, N. J.
Phone LOwell 9-0755

WESTFALIA SEPARATOR | CENTRICO INCORPORATED

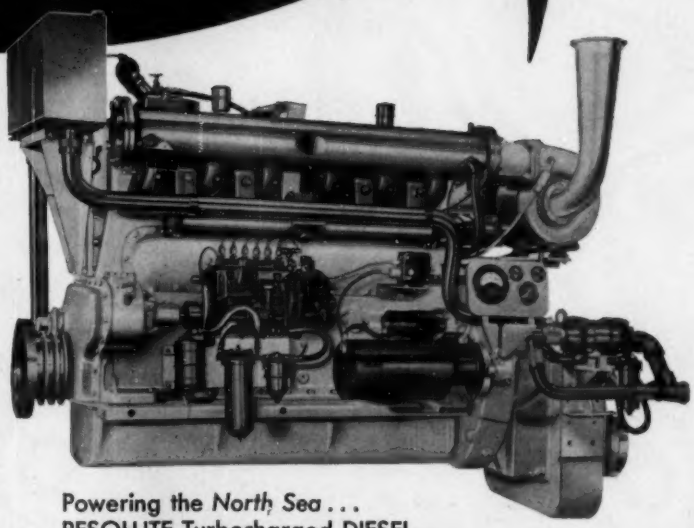
Dragger NORTH SEA

newly built for
Captain Peter Andersen
and his brother
Engineer Harman Andersen



long-time
New Bedford fishermen

power with
WAUKESHA
MARINE Diesel



Newly built for the Andersen brothers... and named for the waters where they fished as youngsters... the *North Sea* is a recent addition to the New Bedford fishing fleet.

Built from a round stern Condon design... by Harvey F. Gamage, Shipbuilder, South Bristol, Maine... this 72′ dragger has a 17′6″ beam, 9′6″ draft. Tonnage is 67 gross, 46 net. The Fiberglas-insulated hold carries 65,000 lbs. of iced fish. Her full complement is nine men.

Powered by a Waukesha Resolute, the vessel's speed is 10 knots. As modern as marine engines come... this turbocharged Diesel puts out up to 260 hp on 24-hour duty. Fuel is carried in four welded steel tanks; 2000 gallon capacity.

Electronic equipment includes Edo radar, Bendix radio-telephone; Bendix depth recorder, Bendix direction finder and two Loran sets.

The Captain is Peter Andersen; the Engineer, Harman Andersen, his brother. They are second generation fishermen; started as crewmen. Out of New Bedford for many years, the Andersens have operated and owned several fishing boats. Their choice of Waukesha power for the *North Sea* is a tribute to the reliability of Waukesha Marine Engines.

Powering the *North Sea*...
RESOLUTE Turbocharged DIESEL—
six cylinders; 6¼-in. x 6½-in., 1197 cu. in. displacement; 260 hp at 1600 rpm for 24-hour duty.

•

For easy starting... safety... simplicity... smoothness... and economy—Waukesha Marine Diesels. Sizes: 426 to 5788 cu. in. displ.; Normal or Turbocharged up to 990 hp for 24-hour duty.

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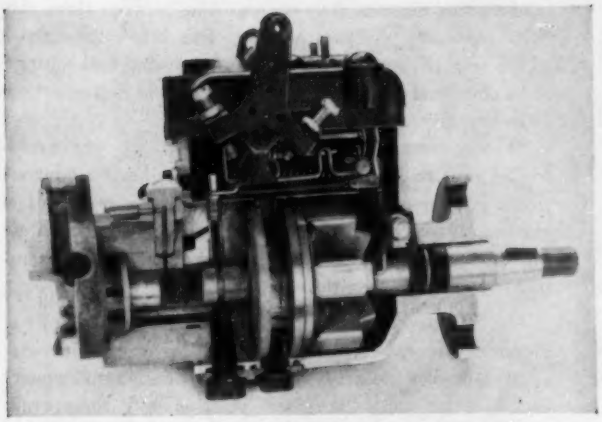


Fig 1 shows an electric governor-controlled RoosaMaster fuel pump. Electric actuator is assembled to underside of the cap. Mechanical governor built into pump is used as an overspeed device.

Fig 2, the control panel, contains all the components of the electric governor except the actuator. All circuitry seen in the block diagram in Fig 3 is on this panel.

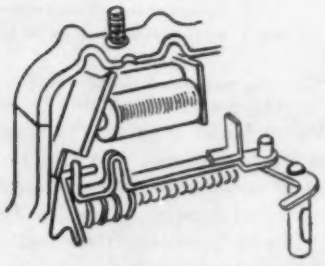


Fig 4, the electric actuator, controls fuel settings through the RoosaMaster pump's existing fuel metering system.

All-Electric Governor Gives Fast, Accurate Response

Sensing load and frequency changes in the generator set as they occur, the governor makes immediate and appropriate corrections of the engine's fuel settings. Such fast response is important for many precise power applications.

TWO generator sets were put on test for us to demonstrate a new all-electric governor's ability to control frequency within extremely precise limits. This governor was designed and built by the Electric Regulator Corp. of Norwalk, Conn., where the test took place. The 60-kw sets on test were designed for military applications. Continental engines drive Electric Machinery generators. Load for the test was obtained from a combination of variable resistance and reactive units capable of fully loading these sets with a power factor variable from 0.0 to 1.0.

Questions concerning governor design, application operation, and maintenance were answered in detail by Jim Ettinger of the company's New Products Sales. Here's how the interview went.

"Jim, what is different about this governor?"

"Our 'Govohm' is completely electric, has no moving parts except for an electric actuator, and therefore is extremely fast and trouble-free. It needs no hydraulic system and has no exposed mechanical linkages.

"Functionally, it is not only very sensitive but because it senses load and frequency directly and, being electrical, is very fast. It corrects fuel settings practically as the events occur. Both its sensing and actuating functions are electrical."

"What is it sensitive to and how close is regulation?"

"It monitors both electrical load and the frequency. When parallel operation is required, it also controls division of load causing two or more sets to share the load (within 5% or better) at isochronous speeds. This block diagram (Fig. 3) shows the general plan.

"When a change in electrical load takes place, a speed change can be expected. The governor immediately alters fuel settings with and in proportion to the load fluctuations. Also, even at steady-state load conditions, speed changes and thus frequency changes can occur. For example, the engine might change speed slightly although at the same fuel setting. This is where the Govohm's frequency detector calls for the necessary correction.

"As for sensitivity, you've seen on the oscilloscope that the governor restores proper frequency within 0.5 seconds or less on a change from no-load to full-load and vice versa. The Govohm will hold the maximum frequency deviation under these conditions to within 1% of rated frequency. Steady-state frequency regulation is maintained to within plus or minus 0.25% or better."

"Where is such governor sensitivity needed?"

"It has both military and commercial application. At present, the greatest demand is for military generator sets. They're used as ground-support units for jet aircraft, missiles and other precise power applications.

"The Govohm also has commercial uses in telecommunication stations and other applications with exacting frequency requirements. Both 50/60 cycle and 400 cycle electric governors are available within reasonable lead times."

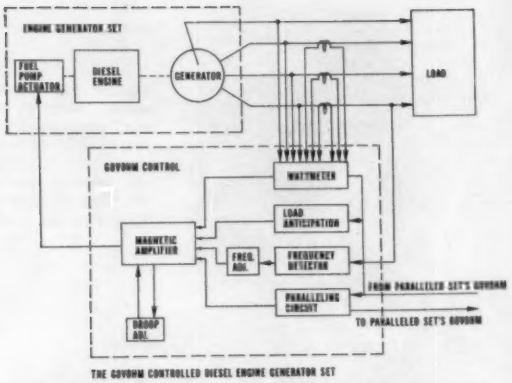


Fig 3, a block wiring diagram of the all-electric governor.

"Can this governor be used with any injection pump?"

"It was developed specifically for use with the RoosaMaster Model D pump. The electric actuator, assembled to the pump cover, (see Fig. 1) is enclosed within the pump and controls fuel settings through the pump's existing fuel metering system (see Fig. 4).

"To my knowledge, there's no reason why the Govohm elements may not be adapted to other injection equipment providing the required development work is completed. However, to date the Govohm has been used only with the RoosaMaster pump."

"How does this electric governor work?"

"If you look at the block diagram (Fig. 3), you'll see that all components except the actuator are mounted on a common control panel (Fig. 2). All the circuitry is here.

"Working backward, the actuator gets its commands from the magnetic amplifier. These commands in the form of a varying direct current are the net result of all the signals fed into the amplifier.

"This amplifier has four control windings. Their functions are:

1. Frequency Detection
2. Load Anticipation
3. Load Division (for parallel operation)
4. Frequency Droop Control (for parallel operation)

"The *frequency-detector circuit* is the primary engine speed control circuit. It is the major controlling factor during steady-state governing. A rheostat is provided for frequency adjustment.

"The *load-anticipation circuit* receives its signal of a load change from a load-sensing circuit. It causes the magnetic amplifier to relay an instantaneous and proportional command for a fuel change to the electric actuator.

"The extremely small time required for the load-anticipation circuit to effect a fuel change, allows the generator set to respond to full-load transients with negligible frequency changes.

"The *load-division circuit*, for parallel operation, makes each unit carry a load in proportion to its rated capacity —no more, no less. When generators are paralleled, load-division windings of each governor's magnetic amplifier are placed in series across the paralleled outputs of the load-sensing circuits. Any current flow between these circuits represents unequal loading. This alters the output of the respective magnetic amplifiers, causing fuel settings to be corrected and each unit to carry a load in proportion to its capacity.

"The *frequency-droop control* permits a Govohm-controlled unit to be paralleled with others having conventional governors requiring speed droop. By means of a rheostat, a bias can be applied to the droop-control winding on the magnetic amplifier. Adjustment produces up to 3% speed droop in the electric governor.

"In the *actuator*, when generator load is reduced or engine speed increases, current through the coils is increased. This moves the actuator finger and the pump's metering valve toward a "less-fuel" position until the correct fuel setting is attained. The opposite action takes place to satisfy a higher fuel requirement, (see Fig. 4).

"What happens if generator power to the governor fails, or the governor itself fails?"

"When operated under electrical control, the engine throttle is placed at its highest setting and locked. This sets the RoosaMaster pump's mechanical governor (Fig. 1) at some speed higher than the Govohm-controlled speed, The mechanical governor is then inactive at rated speeds.

"If the electric governor fails, or power to it fails, engine speed increases to the setting of the mechanical governor or an over speed trip device, whichever is set lower. Operation can be continued under control of the mechanical governor by unlocking the throttle and making a suitable setting. Frequency control will not be so accurate as when under electrical regulation but the unit may be run until the fault can be corrected.

"What about installation and maintenance?"

"You can see that actuator installation is a simple matter of switching pump covers. All other Govohm components are on one control panel assembly that mounts as a unit, (Fig. 2). All that remains to complete installation is to connect several wires.

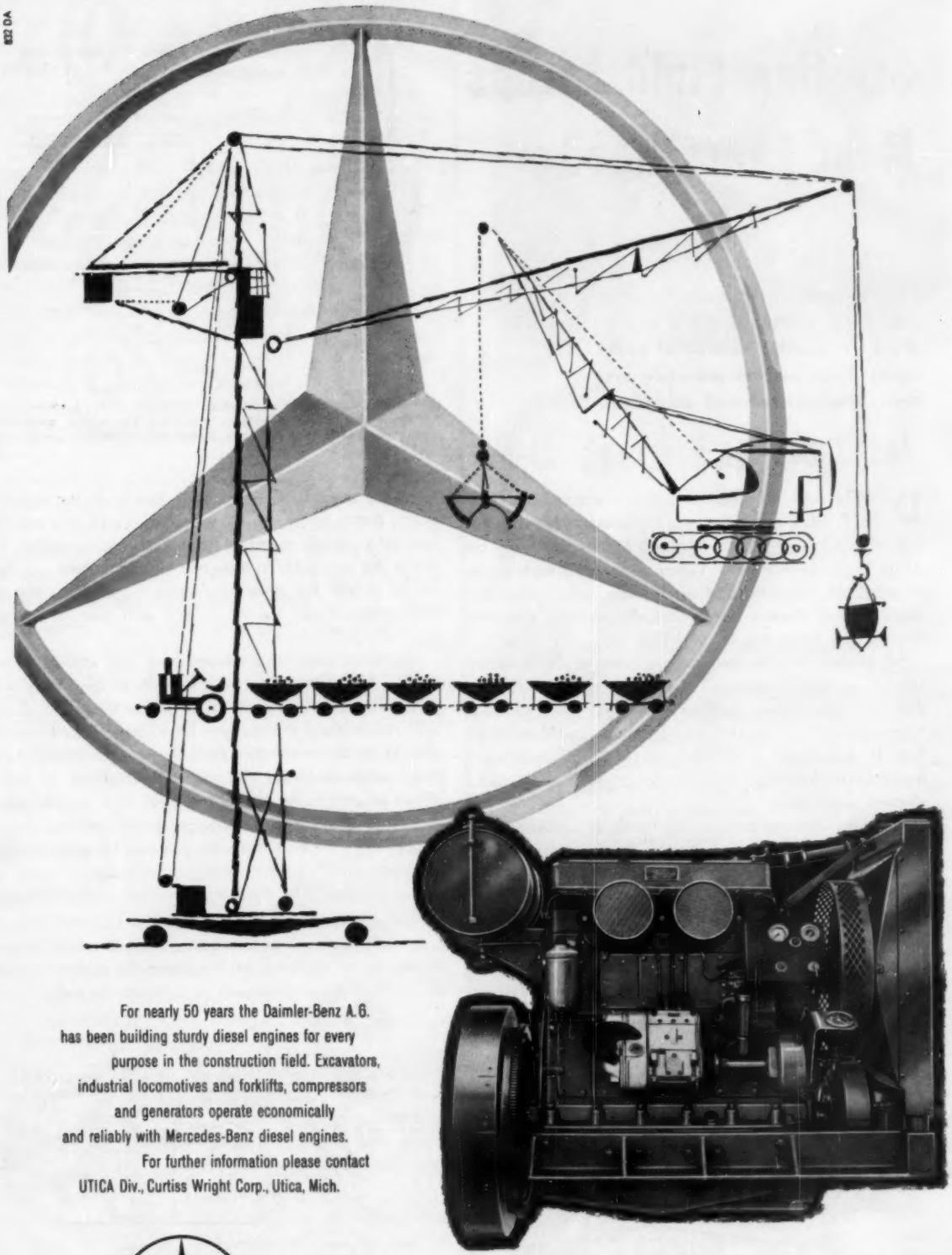
"As for maintenance, no periodic servicing is required. About the only thing necessary is to remove any excessive amount of material that might collect on the control panel. The actuator has the same long life-expectancy as the RoosaMaster pump. Changing the actuator, when required, is a matter of minutes. Repairs to the Govohm control panel are generally limited to replacing a resistor, or some other simple electric component."

"Is the Govohm sensitive to voltage?"

"No. It performs satisfactorily over a wide-voltage range. In fact, it operates even without an automatic voltage regulator. However, we like to have the Govohm used with our Regohm voltage regulator. We have found this combination results in excellent performance."

"One final question, how much of a bill does such high-quality governing run up?"

"Actually, our electric governor can cost less than a good isochronous hydraulic governor."



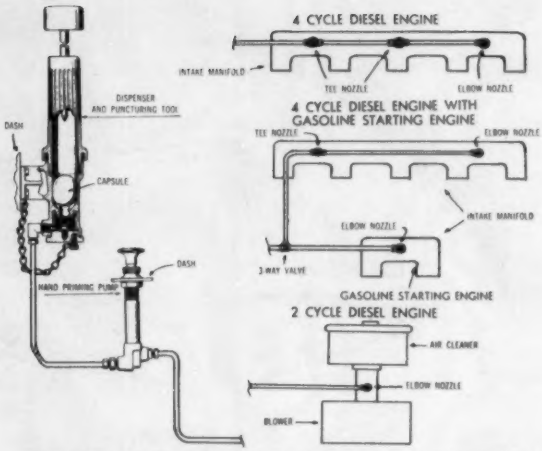
For nearly 50 years the Daimler-Benz A.G. has been building sturdy diesel engines for every purpose in the construction field. Excavators, industrial locomotives and forklifts, compressors and generators operate economically and reliably with Mercedes-Benz diesel engines.

For further information please contact UTICA Div., Curtiss Wright Corp., Utica, Mich.

MERCEDES-BENZ

Starting Fluid Setups Meet Every Need

For the occasional user or the man that needs a starting aid everyday, there's a suitable method of packaging fluids and an induction system. Now—pressurized cartridges.



Typical installations of Chevron gelatin capsule system show various methods of inducting fluid into the intake manifolds. The puncturing tool and hand primer pump assembly are at left.

DIESELS had to be started in temperatures from 30 to 79°F below zero. That was the problem faced by the U.S. Army in World War II during construction of the Alcan Highway in Alaska. Common methods such as use of manifold, headbolt and air heaters, glow plugs and other heating devices were successful only to a limited degree. The Army was not satisfied.

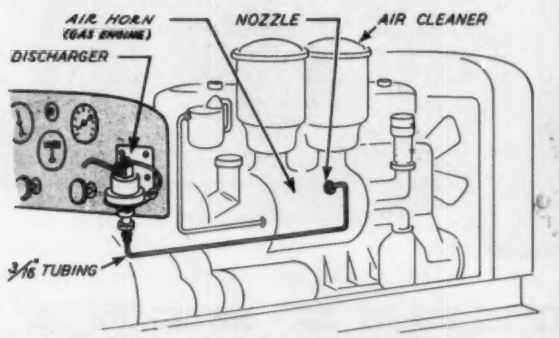
So, at their request, research engineers of the Standard Oil Co. of Calif., developed a product which solved the difficult cold-weather starting problem. This product, Chevron starting fluid, is a specially compounded auxiliary fuel. It is designed to facilitate starting of diesels when temperature, humidity, altitude, or engine design, make starting a problem.

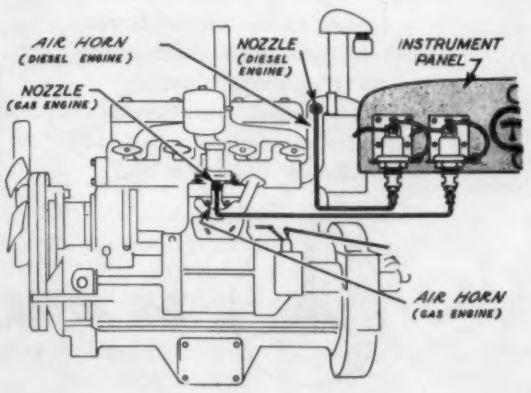
Since the starting problem under these conditions exists, war or no war, Chevron starting fluid was made available for commercial as well as military use after the war. It was well known by this time that in colder sections of the U.S., starting of diesels in tractors, cranes, shovels, draglines, etc., was costing thousands of dollars every winter.

The first method of using the starting fluid on this equipment was a wartime expedient, a hand-priming injection pump, better known as a spray gun. Fluid was squirted into the air intake manifold through the air cleaner or nozzles in the manifold. At least two operators were required, one to prime, the other to operate the engine's starting mechanism. There was no control over amount of fluid injected.

The next method developed was the auxiliary tank system. A tank, mounted in or outside the operator's compartment, was permanently connected to the primer pump. With this method, the operator buys starting fluid in metal containers. However, this results in storage, handling and evaporation problems. A further disadvantage is that it allows incorrect use of starting fluid as a fuel to prime the engine while under load to get more speed and power. Large bills have been paid for parts and repairs because operators couldn't resist stroking the primer to give the engine an extra "lift" when it was already under maximum stress.

In 1948, a way was found to remove the hazards and drawbacks of applying by the foregoing methods. Fluid was packaged and dispensed in a capsule to make it safe





Typical installations of Chevron pressure primer system are seen above and at right. If two dischargers are used, as at right, they are mounted separately since no check valves are included in equipment.

to handle, easy to use and inexpensive. The induction system was simple to install.

Gelatin capsules come in two sizes containing 7 and 17 cc of fluid. They provide the quantity of fluid required to start most engines. Capsules are used with a special puncturing tool and priming system permanently connected to the intake manifold.

One or more capsules are placed in the puncturing tool and holed by pressing down a plunger. Fluid, in a predetermined amount, is then released to the primer pump for priming into the engine by the operator. The priming system has one to three nozzles so that it is adaptable to all engines.

Continuing research resulted in development of a new priming fuel having improved starting characteristics. This fuel, Chevron Pressure Primer Fuel, is packaged under pressure in steel cartridges similar to those used to charge soda-syphon bottles. However, it cannot fit in life jackets or other devices using carbon dioxide-filled cartridges.

Priming fuel injection into the air intake is accomplished by inserting a cartridge into a cam-actuated discharger. This is designed to pierce the sealing cap of the cartridge and direct fuel through a small tubing connected to the air intake.

This method has the following features:

1. It is one of the safest methods of packaging flammable starting fuels.

2. It is said to be foolproof and offer complete protection against leakage when exposed to abnormal heat, water, or shock.

3. Storage and handling problems are eliminated and cartridges are impervious to water, dirt, and atmospheric conditions.

4. No pump is needed to force fluid into the air horn since the fluid is under pressure.

5. The discharger is rugged, easy to operate, and requires minimum maintenace. It is designed to be waterproof, dustproof, and to eliminate escape of flammable material. It is adaptable to any engine and can be actuated from the operator's position.

6. Cartridges can withstand 6000 to 8000 psi but are only filled to about 250 psi. They will stand temperatures of over 600°F without rupture.

Recently, Chevron starting fluid has also been packaged in the spray-type can. This is convenient for those with occasional starting problems or where a permanent type of starting system is impractical. Spray-type cans retain starting fluid without loss due to evaporation. Such loss is a serious objection to the use of bulk fluid.

Standard Oil of California pioneered in development of starting fluids to meet a real and important need. From early work up to today, only one thing has remained constant—the Chevron starting fluid. Methods of packaging and induction systems have all changed for greater effectiveness, convenience and safety. There's a system for every requirement.

A-C Tests Experimental Gas Turbine Tractor

A GAS-turbine experimental crawler tractor is being put through its paces. This Allis-Chalmers P-91 unit is powered by a high-speed Boeing gas-turbine engine Model 502-10C.

The experimental model has been assembled for purposes of research, according to Allis-Chalmers. It is part of their continuous program of investigation into heat engines suitable for powering vehicles.

Torque characteristics of the gas turbine provide the equivalent of a built-in torque converter, such as is standard equipment on A-C's model HD-21 crawler tractor, one of the world's largest. Ability of the turbine to deliver the speed range and flexibility of power required for successful tractor operation will be thoroughly tested and evaluated.

Net horsepower developed by the turbine to drive the tractor is said to equal that of its diesel counterpart. The P-91's external appearance differs little from the current model HD-21.

According to the company, exhaust gases while greater in volume, have been handled in such a way as to avoid any inconvenience to the operator. Noise level of the experimental unit is reported to be equal to the diesel-powered unit. However, the pitch and character of the sound is entirely different.

One of the early steps in this program came several years ago when a group of key technical people from Allis-Chalmers visited Boeing's industrial products division in Seattle, Wash. In the years that followed, extensive research was done by Allis-Chalmers on several turbine engines.

service section

Recent engine and equipment modifications, procedures and recommendations straight from the different manufacturers to you

Rotor Plug Screw Replacement in Roosa Master Pumps

If the rotor plug screw is found loose or is suspected of leaking, the following procedure should be followed for replacement of the screw and gasket:

1. Remove end plate, transfer pump blades and transfer pump liner.
2. Remove rotor plug screw.
3. Remove old copper gasket by hooking it with a small-bladed screw driver or other suitable tool.
4. Apply a *small* amount of *hard setting* thread compound to plug threads and install plug and new copper gasket.
5. Tighten to torque setting below:

For standard rotor, use #202 plug screw, and tighten to (35-in. lbs) using #203 gasket.

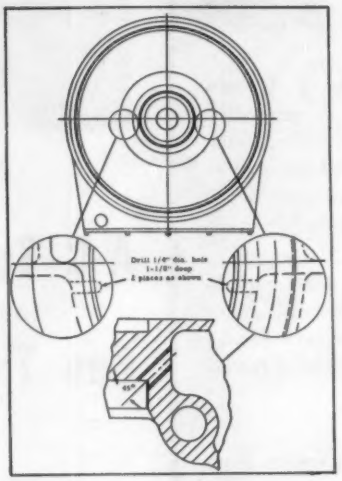
For check valve rotor (H, S, V, W, AD, AE and AF execution pumps), use #2502-1 retaining screw, and tighten to (100-in. lbs) using #2506 gasket.

Replacement should not be attempted unless the screw is found loose, broken or otherwise damaged.

Low Idle Stop for Cat Tailshaft Governors

D315, D318, D326 and D337 Engines equipped with torque converters and output shaft governors now include a low idle stop on the output shaft governor. The low idle stop prevents an extreme output shaft overspeed condition from forcing the diesel engine fuel rack into shut-off position, stopping the engine.

Low idle stops are available for D315 and D318 Engines equipped with an 1L948 Governor Group and D326 and D337 (Series F) Engines equipped with a 2L1535 Governor Group.



Venting Reduces Oil Foaming In GM Torque Converter Sump

When the engine of a vehicle incorporating a Series 300 torque converter is suddenly shut down before the vehicle comes to a stop, oil may spill or foam out of the dipstick hole of the converter. Since the turbine is splined to the output shaft, it continues to rotate as long as the vehicle continues to move.

When the engine is shut down, the converter charging pump, which is input driven, also stops and the oil is pumped out of the converter into the sump. Due to an air pocket in the sump (on the side opposite the oil filler tube) the converter sump is unable to handle the returning oil rapidly, and the oil therefore foams out of the oil filter tube.

This foaming condition should be relieved by providing adequate venting of the torque converter sump. With the converter charging pump removed, drill as shown, two 1/4-in. diameter holes, 1 1/8-in. deep. An electric hand drill with a suitable stop may be used.

The 1 1/8-in. dimension is specified to protect against possible damage to the outside wall of the converter housing. When drilling is finished, it is important that the converter housing be thoroughly cleaned so that any chips that may have fallen into the converter sump are not passed through the converter when it is reassembled and again put into service.

All production torque converters beginning with serial #17486, have been vented in this manner.

IH Camshaft Revised

Camshafts on the following units have been revised to prevent the camshaft nut from getting loose: U-4, U-6, U-164, U-169, U-175, U-264, and U-281 Power Units; IU-4, IU-6 and IU-6A Engine-Over-Axle Units.

Camshafts are revised as follows:

1. Threads on camshaft are changed to a left-hand thread in place of right-hand thread.
2. A new left-hand thread camshaft gear nut 368 598 R1 is released in place of right-hand thread nut 23 174 V.

NOTE: Camshaft gear nut 23 174 V is still retained for service requirements.

3. Camshaft nut lock, 16 025 D previously used with the right-hand thread nut is eliminated.
4. A new camshaft assembly, 48 196 DBX, which includes the new left-hand threaded nut 368 598 R1 is released for service use on U-6, U-264 and U-281 power units; IU-6 and IU-6A engine-over-axle units; I-6 wheel tractors; and T-6 crawler tractors.
5. Camshaft assembly 49 900 DCX currently specified for service use on U-4, U-164, U-169 and U-175 power units. IU-4 engine-over-axle units is revised in that camshaft now has left-hand thread with new left-hand threaded nut, 368 598 R1.

industry news

Mobile Laboratories Aid Fram Field Engineers

New Fram Corp. mobile laboratories consist of station wagons which carry product samples, literature, laboratory display and other equipment.

These units assist Fram field engineers in thoroughly acquainting customers' personnel with oil filtering systems and filters used in automotive systems. They also help in clearing up confusion arising from popular "claims" and "stories" regarding the subjects of oil and filtration.

Dual-Purpose Compactor

A dual-purpose compaction unit, built by Seaman-Gunnison Corp., now has a dump body to speed lightening or emptying of ballast. It is powered by an 88-hp International Harvester diesel. The Duo-Pactor can also be used as an off-highway hauler with an 8-12-cu yd payload capacity.

As a compactor, it combines the functions of steel and pneumatic compaction equipment. A built-in scarifier is located in back of the drive wheels. Weight of Duo-Pactor empty is 18,000 lb. It carries a 32,000-40,000-lb payload.

Trackless Freight Trains

These monster rubber-tired freight 'trains' serve as mobile extensions of conventional railheads in rugged timberlands along the Maine-Canadian border. The huge tractor-trailer rigs, said to be the largest of their type ever developed, pick up a 125-ton load of pulpwood along remote logging roads and transport it to railheads where it is shipped to paper processing plants.

Each train consists of a 170-hp diesel-powered Mack truck and three trailers. These trains, capable of carrying 54 cords of pulpwood at one time, are effecting substantial savings in time and costs. They were developed jointly by Mack Trucks, Inc., the International Paper Co. and trailer builder B. M. Clark.

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industry news

(*Continued from Page* 91)

More Kenworths For Trucking Co.

Denver Chicago Trucking Co., Inc. is adding 13 Kenworth cab-over-engine Model 523 trucks to their large fleet of Kenworths already in use. These trucks are equipped with Cummins NH-6-B diesel engines.

The new tractors, now under production at the Seattle Kenworth factory, are all to be equipped with 73-in. tilt cabs with sleepers.

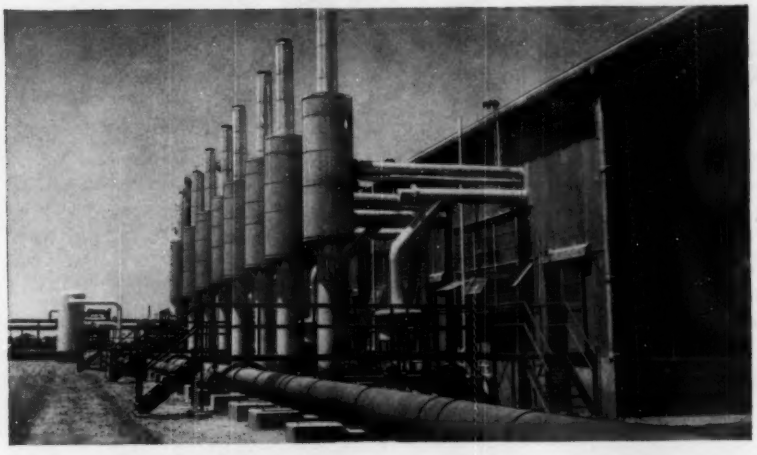
Trailer-Mounted Distillation Unit Tested

Shipment of 69 trailer-mounted sea water distilling units for the U.S. Marine Corps will soon be completed. The diesel-powered 85 gph units were made by the Special Products Div. of Cleaver-Brooks Co. These vapor compression type distilling units convert sea water or brackish water to fresh water for troops on the move.

Each unit is powered with a Waukesha Model 180 DLC, 4-cyl, 4-cycle, heavy-duty, industrial diesel engine rated 22 hp at 1250 rpm.

SILENCING

AT ITS BEST—WITH SOMETHING EXTRA



Many things affect the design and performance of silencing equipment. It takes experience to discern, classify and screen these influencing factors. The "extra" in every Maxim installation is this: it is based on an evaluation by specialists with unequalled experience in noise suppression.

Add to this basic advantage such other pluses as Maxim's tested and proven principles, the most extensive line of silencers, and consistent research and development — and you can see why Maxim silencers are preferred and more widely used throughout industry than any other make — and why you can specify Maxim with complete confidence.

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"Guide to Maxim Silencers"
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THE MAXIM SILENCER COMPANY
Subsidiary of Emhart Manufacturing Company
93 HOMESTEAD AVENUE, HARTFORD, CONNECTICUT

AGC Survey

The construction industry again is bolstering a sagging economy and leading the way out of a recession. This is apparent from replies in a telegraphic survey of construction activity and prospects conducted among the 125 chapters of The Associated General Contractors of America.

The majority of the replies indicated:

1. Current construction activity is normal or above normal for this season of the year in most areas of the country.
2. Construction prospects for the remainder of 1958 are considered better than normal in a majority of areas and at least normal in most others.
3. The federal-aid highway program is on schedule or ahead of schedule in most areas.
4. The recession has had little or no effect on construction activity in most instances.
5. The recession has leveled off in most areas and lessened in many.
6. Competition among general contractors continues to be very keen and is greater now than a year ago.

Replies to the questionnaire were received from 98 of the 125 AGC Chapters, or almost 80%.

The construction industry is the nation's largest production activity, accounting for more than one-seventh of the gross national product and a similar proportion of total employment, directly and indirectly.

With the bulk of construction machinery diesel-powered, our industry should soon be feeling results of this optimistic situation.

Missile Tracking Stations Are Diesel-Powered

Test data relating to missile space positions and performance is collected by electronic, optical and photographic means at a series of downrange stations that extend thousands of miles out in the South Atlantic.

Dependable diesel generating units on each island furnish the power for the tracking installation and the instrumentation equipment used in recording every detail of the missiles' flight patterns.

More Deltic Locomotives For British RR's

A fleet of 22 more locomotives of the diesel-electric Deltic type, built by the English Electric Co. has been ordered by The British Transport Commission.

Weighing only 106 tons with a rating of 3300 hp, the Deltic is said to have the lowest weight power ratio ever achieved in a diesel locomotive, 72 lb per hp. It is geared for a maximum speed of 105 mph.

Primary power comes from two Napier Deltic high-speed, lightweight, 2-cycle diesels, each driving a 1100-kw main generator and a 45-kw auxiliary generator. The main generators supply power to six axle-hung traction motors. Current at a constant low voltage from the auxiliary generators is used for battery charging, main generator field excitation and the operation of all auxiliaries.

World Power Conference To Be Held In Canada

One of the largest international gatherings of its kind ever held will open in Montreal next September 7th.

The occasion is the technical session of the World Power Conference. Meeting in Canada for the first time, it is expected to attract more than 1000 scientists, engineers, economists and other experts from about 50 different countries.

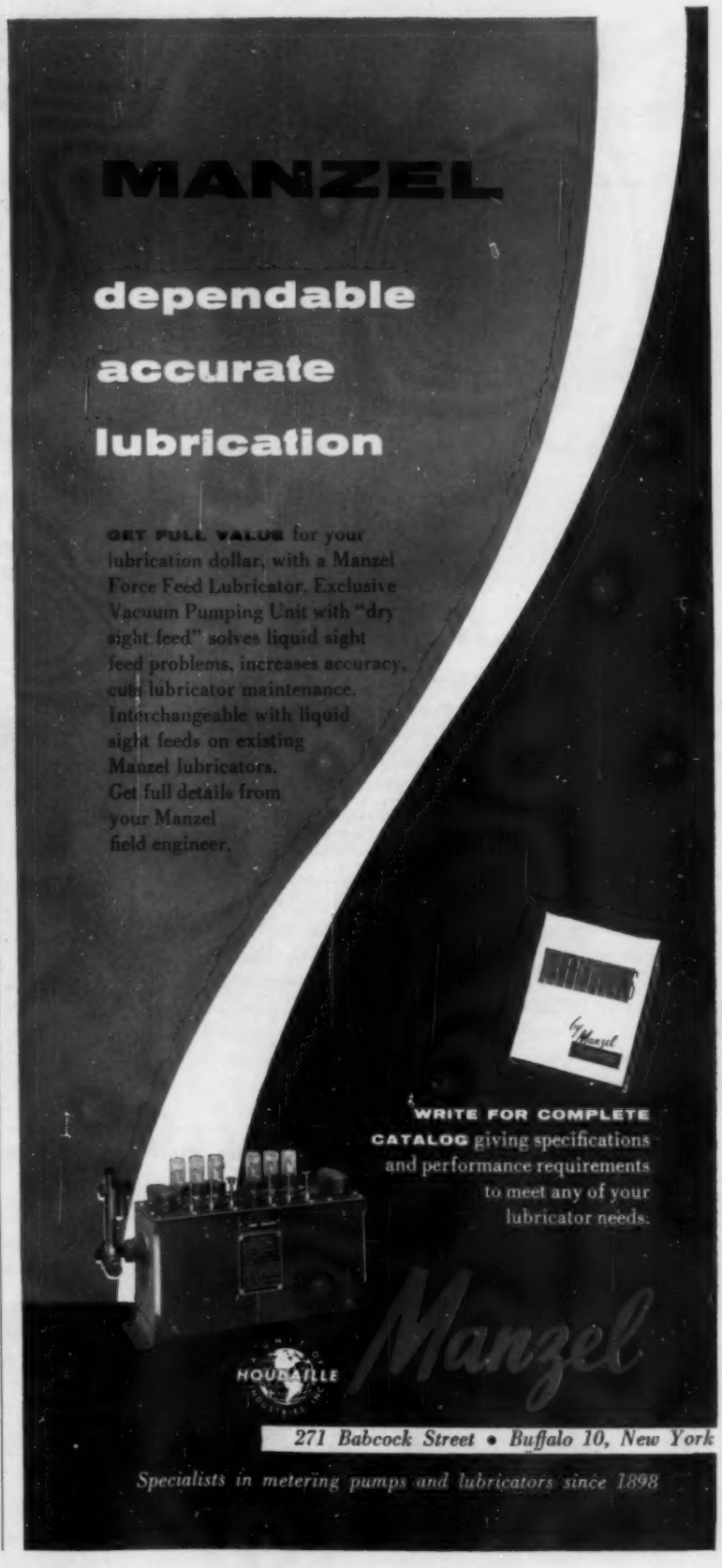
The meeting will be held at The Queen Elizabeth, Canada's newest and largest hotel, from September 7th to 11th. Proceedings will be conducted in English and French, by means of simultaneous translation facilities.

Brazil Modernizing Ports With Diesel Locomotives

Brazil is modernizing the operation of her ports with new diesel-electric locomotives. The country recently placed an order for fifteen 45-ton and two 65-ton diesel-electrics with the International General Electric Co. These units will be made by G-E's Locomotive & Car Equipment Dept. in Erie, Pa.

The locomotives will be used for switching freight cars delivered to the various ports by their railroads.

(*Continued on Page* 106)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accurate
lubrication
GET FULL VALUE for your lubrication dollar, with a Manzel Force Feed Lubricator. Exclusive Vacuum Pumping Unit with "dry sight feed" solves liquid sight feed problems, increases accuracy, cuts lubricator maintenance. Interchangeable with liquid sight feeds on existing Manzel lubricators. Get full details from your Manzel field engineer.
WRITE FOR COMPLETE CATALOG giving specifications and performance requirements to meet any of your lubricator needs.
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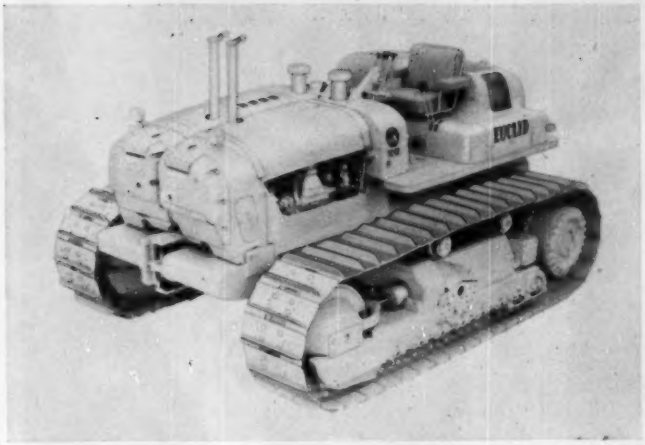
271 Babcock Street • Buffalo 10, New York
Specialists in metering pumps and lubricators since 1898

new products



Euclid's New Series TC-12 Crawler

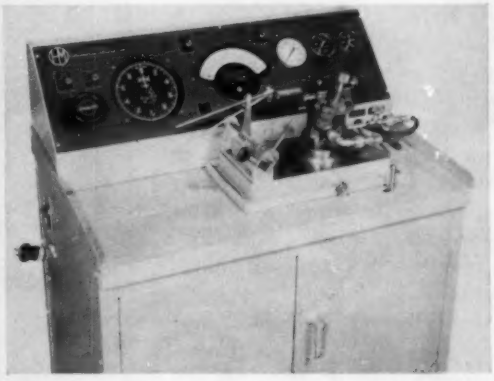
Many major improvements have been made in the Model TC-12 crawler tractor by the Euclid Div. of GM. It now features: 402 hp to the power train; two Torqmatic drives with independent planetary track drives; no steering clutches; 8-roller track frames; rear-mounted cooling system; in-seat starting; fully-automatic hydraulic track recoil adjustment; and unitized assemblies.

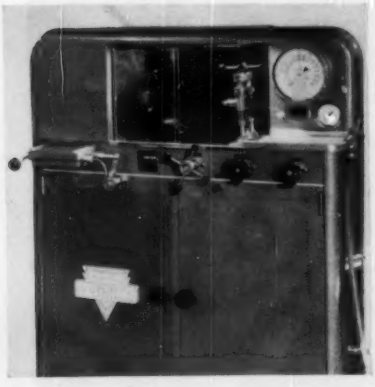
These design improvements are said to have resulted in: longer wearing components; greater accessibility of many components for faster, easier servicing; and better overall operation.

Air-Operated Test Stand For Small Governors

An air operated test stand is now available for hydraulic governors of either speed droop or isochronous types used on small diesel and gas engines. The Hill Machine Co. has designed and equipped it with adaptors for Woodward SG and PM Series governors. However, adaptors can be furnished for other governors of similar sizes and types.

The test stand performs all functions necessary for checking a governor completely after overhaul and rebuilding. It has a self-contained, temperature-controlled oil supply to simulate operating conditions for hydraulic governors. It is driven by an air motor with a speed range of 0-5000 rpm. This speed is controlled by the governor on test and indicated by an electric tachometer. Suitable linkage adaptors are furnished for both terminal shaft and fuel rod types of governors. A slow-speed, auxiliary-drive system duplicates engine cranking speeds.





Hartridge Universal Diesel Nozzle Analyzer

The Hartridge Universal Diesel Nozzle Analyzer, permits nozzle testing during any part of its injection period. It also shows needle action throughout this period. Plus this, it checks needle oscillation at varying rates of flow and the degree of atomization during any part of injection.

With this unit, the injector is tested by applying a continuous flow of high pressure oil to the nozzle. Rate of flow can be varied from nil to full demand and maintained at any desired rate. Precise observation of nozzle action by slow motion is therefore possible.

Other features include a quick-action injector holder, illuminated spray cabinet, combination time and pressure gauge, and centrally located controls.

Diesel Injection Sales & Service, Inc., Norfolk, Va., is the exclusive distributor in the U.S. for Leslie Hartridge, Ltd., products.

New Aluminum Die Casting Alloy

A new aluminum die casting alloy, made by the Aluminum Co. of America, combines built-in structural strength with bearing strength.

Alloy X385 is especially suited for use where it is advantageous to provide integral bearing surfaces instead of cast-in or specially-assembled bearings or bushings. This gives designers the opportunity to simplify component design.

The new alloy is said to withstand loads of 1500 psi while alloy 380, long a standard for light bearing applications, remains the choice for loads up to 900 psi.

Hall-Toledo Introduces Dual-Purpose Tool

Hall-Toledo now offers the Model MR valve seat inserter—valve guide reamer, a new dual-service tool to ream valve guides oversize and counter-bore the head or block prior to inserting valve seat rings. Both operations are accomplished by a single machine setting. Besides simplifying valve service work, the single setting assures a high degree of concentricity between the valve guide and the insert ring.

The tool features expandable cutters that permit counterboring of any diameter within the range of the tool plus spinner and clearance blades. Its design provides for accurate control at any angle up to 45 deg from the gasket face of the cylinder head.

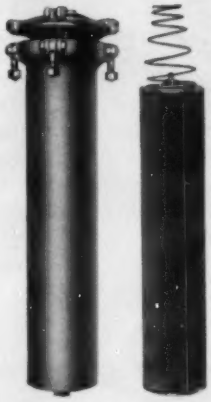
Generator With Engine Cranking Motor

Kato Engineering Company's new 187-kva, 120/208-v, 3-phase, 60-cycle a-c generator has a d-c engine cranking motor mounted on its shaft. This engine starting motor has a cranking torque of 600 ft lb at 200 rpm and will crank continuously for five minutes. The necessary direct current in this case is supplied from storage batteries.

The direct current exciter which supplies current to the field poles of the a-c generator is mounted on top of the cranking motor and is belt driven.

(*Continued on Page* 96)

NUGENT
FILTERS • STRAINERS
LUBRICATION SPECIALTIES



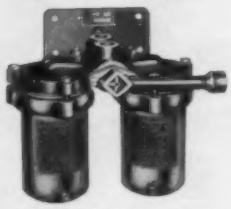


Fig. 1555BF Duplex Filter uses factory packaged laminated fiber disc filtering elements. Each filter comprising duplex operates independently or in parallel. Wide range of sizes.

Fig. 1576 Bag-Type Pressure Filters feature inexpensive, completely disposable filter cartridges. For filtering fuel oil, lubricating oil and wide variety of fluids.

AT LEFT: Fig. 1555-4L Filter and laminated disc cartridge. High flow rate; low pressure drop. Excellent micronic efficiency. Cartridges interchangeable with all other Nugent Bag or Depth Type cartridges.

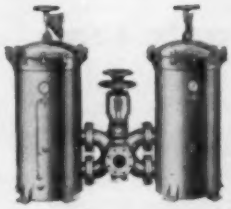


Fig. 1554AN-4L7 Duplex Strainers provide the advantage of uninterrupted flow, without by-passing, while cleaning the strainer baskets. Each strainer comprising duplex uses 7 strainer baskets Fig. 1554A-4L.

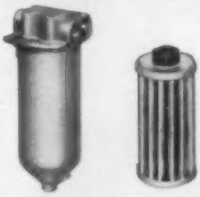


Fig. 1490AM-0 star-shaped extended area strainers offer increased free screen area over round basket type.

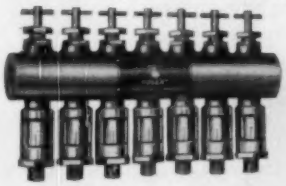


Fig. 1503F Multiple Pressure Oilers are available with from 2 to 24 feeds.

Fig. 524 Sight Feed Valves with removable glass. ¼" to ¾" IPS.

Fig. 1575 Pressure Sight Flow Lubricator. Single units or multiples to 15.

Fig. 1366E Sight Flow Fittings for indicating flow of liquid in a pipe line. Available in brass, cast iron, steel or stainless steel.

Valuable equipment deserves the best possible protection that can be provided. Nugent offers a complete line of filters, strainers and lubrication specialties for this purpose. All are backed by the experience and know-how gained through solving industry's problems in this field for more than 60 years. For bulletins giving complete information on any or all Nugent products, call or write today.

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3426 CLEVELAND STREET, SKOKIE, ILLINOIS

OIL FILTERS • STRAINERS • TELESCOPIC OILERS
OILING AND FILTERING SYSTEMS • OILING DEVICES
SIGHT FEED VALVES • FLOW INDICATORS

new products

(*Continued from Page* 95)

New Precision Gage and Measuring Device

Sunnen Service Corp. introduced their new PG-800 precision gauge and PG-400 size-setting fixture for measuring internal diameters, at the ASTE Tool Show in Philadelphia, May 1-8. Combination of these two instruments represents an entirely new system of internal precision-measuring without use of ring gauges, gauge blocks, or other standards.

The precision gauge and setting fixture combination is mechanical in operation and designed to withstand everyday shop use in production and inspection. Its range is from ⅜-in. to 1½-in. diameter.

Safer Dye Penetrant Inspection

Magnaflux Corp. has announced safety improvement in its Spotcheck dye penetrant inspection materials. These are now available in nonflammable or very-high-flash-point formulas in either pressure-spray cans or in bulk.

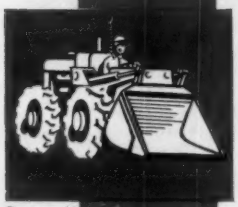
the best costs less

Simplicity is the word for ROOSA MASTER fuel injection pumps. Small in size and weighing less than 10 pounds, there are fewer parts to service, fewer adjustments, which means lower service costs.

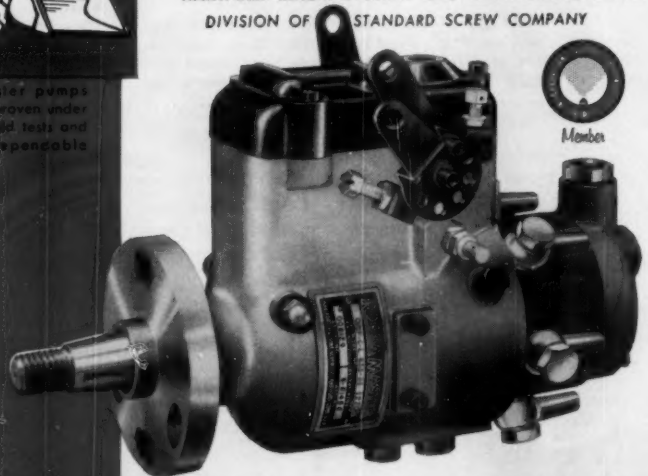
Only one model size is adaptable for either a 2, 3, 4, 6 or 8 cylinder engine. Compare its initial cost and installation cost for further proof that the best costs less.

HMS ROOSA MASTER makes good diesels better

HARTFORD MACHINE SCREW CO., HARTFORD 2, CONN.
DIVISION OF STANDARD SCREW COMPANY



Roosa Master pumps have been proven under extensive field tests and years of dependable service.



Member

YOU CAN DEPEND ON THE DIESEL THAT DEPENDS ON ROOSA MASTER

Snyder Piston Weigh-Milling Machine

A new milling machine automatically removes material from oversize diesel engine pistons in accordance with a precision weight measurement. It has been designed and built by Snyder Tool & Engineering Co. for use in mass-production work. A weight tolerance of plus or minus 0.02 lb is maintained in the milled parts.

The machine is designed to handle 4⅜-in. aluminum or cast iron pistons as well as 3⅜-in. aluminum pistons of varying designs and weights. A built-in memory device in the electrically-controlled machine automatically sets the depth of cut of the milling cutter based on readings of the precision electronic weight scale.

Combination Wire Twister and Cutter Saves Time

A new tool that grips, twists and cuts safety wires fast, is now available from the Milbar Corp. It is practical for use in safety wiring of engine fastenings, injection equipment. A completely automatic spring-return and ratcheting-action eliminates need to shift hands. No pushing is necessary.

Automatic Renewable-Media Air Filter Cuts Installation Time

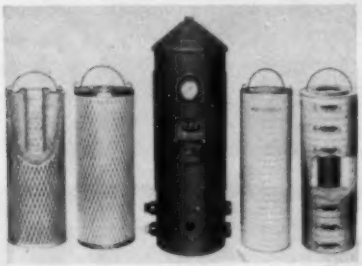
A Roll-O-Matic automatic renewable-media air filter introduced by American Air Filter Co., Inc. can be shipped in small cartons. The new modular design is said to cut installation time in half, permit easier storage on the job and does not require rigging for installation.

Other features include stronger media and an adhesive which will not 'run' in high temperatures, 'thicken' in low temperatures, nor lose its adhesive qualities due to dryness.

Device Detects And Controls Multiple Speeds

Up to eight separate speed sensing switches can be incorporated into a new compact housing developed by Torq Engineered Products, Inc. for their line of Synchro-Snap speed detectors.

A typical example of use is for diesel engine control. Four separate Syncro-Snap switches are used in the compact housing to control four separate circuits. They operate from a common shaft. The first switch automatically cuts out the cranking motors at a predetermined speed of the diesel. The second unit engages and disengages the cooling circuit at specified speeds. The third unit actuates the fuel system based on requirements at different speeds, and the fourth speed detector switch provides for full speed signaling.



Honan-Crane Filter for Hydraulic Fluids

The latest CFC Honan-Crane filter was developed by Indiana Commercial Filters Corp. to provide microclarity of hydraulic fluids, fuels and mineral oils. Two new interchangeable cartridges may be used, Flo-Pac "5" for removal of solid contaminants down to 5 microns and Type "K" cartridge using Type "T" Cranite (fuller's earth) for removal of solid and dissolved contaminants.

Flo-Pac "5" is made from resin-impregnated pleated paper. The company says that it will not be affected by water or remove additives.

Type "K" Cranite Cartridge meets "JIC" hydraulic standards. It removes water, acids, tars and asphaltenes as well as solid contaminants.

(*Continued on Page* 108)

For details on these or other products, use the Reader Service Card

Whether you design, operate or maintain gasoline or diesel-powered engines—automotive or otherwise—you will be interested in a new, inexpensive way to detect the need for paper air-filter replacements.

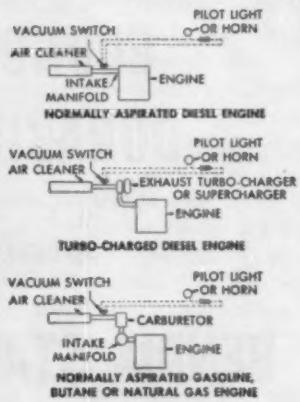
This new product, the Fulton Sylphon No. 28 Vacuum Switch "senses" the air from the air cleaner, reports any undue increase in manifold vacuum to a warning light or horn. In a truck, for example, the warning would be flashed to a light on the dash.

The switch is usually located in the manifold from the air cleaner. Its use eliminates the need for air-filter inspections, avoids premature discard of usable filter elements, prevents excessive fuel consumption and smoking exhaust.

No. 28 Vacuum Switch (shown ½ size). Switch is especially designed to resist severe vibration and is enclosed for protection from corrosion, dirt, and moisture.

ALSO AVAILABLE IN KIT FORM—Although often supplied as original equipment, the No. 28 Switch is available individually or as a kit for fleet owners or individual operators. Kit includes the Switch, a rugged warning light for panel mounting, and complete installation instructions.

TYPICAL APPLICATIONS



WRITE FOR BULLETIN ND 104

Robertshaw-Fulton CONTROLS COMPANY

FULTON SYLPHON DIVISION · Knoxville 1, Tenn.

people and plants

Commercial Filters Corp. Acquires Industrial Filtration Co.

Commercial Filters Corp., a subsidiary of Ogden Corp., has acquired the Industrial Filtration Co., manufacturers of Delpark filters. Delpark will operate as a part of Indiana Commercial Filters Corp. with headquarters in Lebanon, Ind.

Technical literature is available on request. Just use the Reader Service Card.

Engineering Executives Promoted By Mack

W. J. Pelizzoni, formerly assistant executive engineer, has been named executive engineer in charge of the Engine Design Dept., Plainfield, N.J.

J. S. Richards, has been named assistant executive engineer in the Vehicle Design Dept., Allentown, Pa.

F. F. Fox, has been named manager of the Engine Design Dept. Laboratory, Plainfield, N. J.

Sales Manager For Eaton's Valve Division

D. D. Roberts, formerly a sales engineer for Eaton Manufacturing Company's Valve Division, has been promoted to sales manager of the Division. He succeeds J. R. Stearns who died recently.

Mr. Roberts joined Eaton as an engineering trainee following his graduation from the University of Detroit in 1951 with a Degree in Mechanical Engineering. A year later, he was assigned to the Valve Division's sales headquarters as a sales engineer.

D. D. Roberts

Hicklin GM Diesel, Inc. Moves

Hicklin GM Diesel, Inc., newly-formed GM Detroit Diesel Engine distributor in the Iowa-Nebraska area, has occupied its new main building in Des Moines. According to owner-president Robert V. Hicklin, the new quarters have been recently completed. They are located in Des Moines at 5425 Second Avenue (Iowa State Highway 60), where complete sales and parts-service facilities have been established.

N. J. Cummins Engine Distributorship Sold

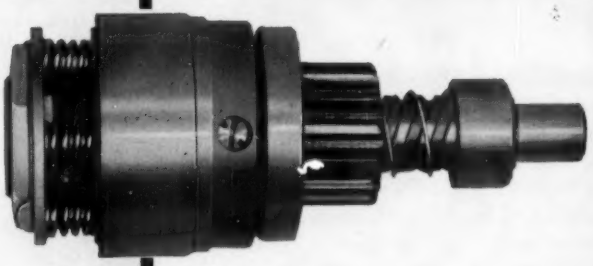
The New Jersey distributorship for Cummins diesel engines has been purchased from the Cummins Engine Co. of Columbus, Ind. It will be operated as a private enterprise by Cummins Diesel Metropolitan, Inc. E. C. Sulzman is president of the new company which has its headquarters at the intersection of Rts. 1 and 22.

for

PERFORMANCE
ECONOMY
DURABILITY

specify

BENDIX STARTER DRIVES



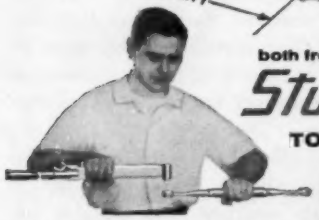
In starter drives BENDIX means QUALITY. That fact, accepted by automotive men for almost half a century, is just as well-known to diesel engineers today. That's why the Bendix* Starter Drive is standard equipment on more diesel engines than any other make. It can be mounted more easily and in more positions. It requires no actuating linkage—the solenoid can be placed in any convenient position. It is simple in design, has fewer parts, needs fewer adjustments. No matter what your type of diesel, you'll be wise to specify and demand the Bendix Starter Drive for outstanding performance and economy. *REG. U.S. PAT. OFF.

Bendix-Elmira, N.Y.
ECLIPSE MACHINE DIVISION

Bendix
AVIATION CORPORATION

NOW... 2 TORQUE Ranges
(to 900 Foot pounds)

both from one
STURTEVANT
TORQUE WRENCH



Now you can do high torque work with a Sturtevant Torque Wrench of normal capacity range—small in size—light in weight—with fine increment markings and moderately priced.

With a new Multi-range, Multi-purpose Adapter you can step up the capacity of your Torque Wrench to a new high range and you can plug in any drive end you want... Box wrench, ratchet, drive square for sockets.

All drive end accessories are interchangeable and stock items.

In this way each Sturtevant Torque Wrench effectively equals two complete sets of ordinary single purpose Torque tools.

WIDE CHOICE OF INTERCHANGEABLE DRIVERS

Only Torque wrenches with the Sturtevant patented pivoted handle can be accurate with adapters.

write for No. SD-77 catalog sheet

P.A. STURTEVANT CO.
ADDISON QUALITY ILLINOIS

KIENE® DIESEL
PRESSURE
INDICATOR

gives compression and firing pressures faster

SIMPLE
RELIABLE
COMPACT

Send for Bulletin K-100

The Model K-100 Kiene Pressure Indicator accurately measures compression and firing pressures — assures the proper maintenance of diesel engines — helps prevent costly down time. Only one moving part — no friction or inertia effects — no complicated adjustments.

KIENE DIESEL ACCESSORIES, INC.
10352 PACIFIC AVE., FRANKLIN PARK, ILLINOIS

Appointments At Cooper-Bessemer

J. R. Craine has been promoted to branch manager of the East Central District office of The Cooper-Bessemer Corp., Mount Vernon, O. He is now responsible for all application and sales of engines and compressors in the East Central area.

R. L. Reynolds was promoted to branch manager of the Grove City Sales Office, Pa. He fills the position formerly held by F. W. Green, who has retired. Mr. Reynolds will be responsible for application and sale of compressors, diesel, gas and gas-diesel engines in Western Pa. and Western N. Y.

J. H. Caldwell has been appointed district service mgr., Pacific Coast. He will be responsible for supervision of all C-B service activities in the Los Angeles, Seattle, San Francisco and Casper, Wyoming areas.

F. L. Friedli is now assistant sales manager, special projects. He will be directly responsible for the sales of automatic controls to the oil, gas, chemical and power industries.

D. T. Koch has been assigned sales engineer to the C-B East Central District Office, Mount Vernon, O. He will work under the direction of J. R. Craine, branch manager, and will contact gas transmission companies, oil and gas processing plants and users of industrial and municipal power.

R. L. Kietzman has been appointed sales engineer for the C-B St. Louis Branch Office. He will work under F. J. Hunter, branch manager, and be responsible for engineering and sales contacts with users of compressors and engines in the Missouri and Southern Illinois areas.

H. F. Neuman gets the post of sales engineer of C-B of Canada, Ltd. He will contact users of engines and compressors in Western Canada.

New District Sales Manager For Robertshaw Div.

R. E. Fitzpatrick has been appointed district sales manager in Cleveland, Ohio, for the Fulton Sylphon Div., Robertshaw-Fulton Controls Co. He joined the company in 1947.

Great Lakes Diesel Co. Relocates

The Great Lakes Diesel Co. distributor of GM diesel engines in northern Ohio, has moved into its new main building recently completed in southwest Cleveland.

The new quarters are at 4980 W. 150th Street. Complete sales and parts-servicing facilities have been established here. Formerly located in downtown Cleveland on the Cuyahoga River, the company has retained docking facilities in the old location.

Ladish Co. Opens New Plant

The Ladish Co., has announced opening of a new manufacturing plant, sales service office and warehousing facilities. These will operate as the Ladish Co. Texas Div.

This plant, located in Houston at 1301 West Belt Drive North, will serve the expanding needs of industries in Texas, the Gulf Coast area, Mid-Continent and the Southwest. It will give complete service in supplying drop forgings and allied products.

(*Continued on Page* 100)

people and plants

(*Continued from Page 99*)

American Air Filter Names New NYC Manager

William Peters has been named manager of the New York City branch office for American Air Filter Co., Inc.

Peters comes to AAF from the Anemostat Corp. of America, where he was assistant general sales manager. He is a graduate of Cornell University, with a BS degree in mechanical engineering.

Detroit Controls Organizes Marketing Department

F. G. Coggin has become general manager, sales and marketing, Detroit Controls Div. of American Standard. Assisting Mr. Coggin, as marketing and planning manager, will be F. J. Kreissl. A. L. Fuller, was named sales manager with direct sales responsibilities.

Under the new marketing plan, sales activities will be more concentrated in the regional offices to bring the company into more intimate relationship with its customers.

ROCKFORD

OIL FIELD TYPE

LONG LIFE
Heavy-Duty

POWER TAKE-OFF
Eliminates the Pilot Bearing

- Eliminates the Pilot Bearing
- Release and Main Bearings are lubricated for one year
- Main Bearings are 40,000 hour type
- Handles 5,000 pound Belt Loads
- Out-Board Bearings and Flexible Couplings eliminated
- Furnished with Single or Double Plate, Organic or Morlife® faced Gear tooth Type Clutches

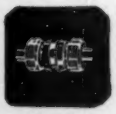
Insure longer work life and reduce down-time with this NEW extra heavy-duty ROCKFORD POWER TAKE-OFF.

BW SEND FOR THIS HANDY BULLETIN
Gives dimensions, capacity tables and complete specifications. Suggests typical applications.

ROCKFORD Clutch Division BORG-WARNER
1301 Eighteenth Ave., Rockford, Ill., U.S.A.
Export Sales Borg-Warner International — 36 So. Wabash, Chicago 3, Ill.

Small Spring Loaded

Heavy Duty Spring Loaded


Oil or Dry Multiple Disc

Heavy Duty Over Center

Power Take-Offs

Speed Reducers

CLUTCHES

Allison Organizes "On-Highway" Sales Staff

Allison Div. of GM has reorganized its Transmission Sales Dept. to provide for an "on-highway" sales staff as well as the existing "off-highway" group. J. A. Lane, manager of sales and contracts, Transmission Operations, has announced the appointment of John K. Knighton as assistant sales manager for on-highway equipment.

The off-highway sales and service groups will be directed by H. N. Roberts, assistant sales manager for off-highway equipment.

J. D. Morris

A-C Makes New Sales Department

Expansion of its utility tractor business is announced by Allis-Chalmers Mfg. Co. with the appointment of J. D. Morris as sales manager of the new Utility Tractor and Equipment Sales Dept. Utility products will be sold through dealers in the Construction Machinery, Engine-Material Handling and Farm Equipment Divisions.

A-C has also set up a program of engineering clearance under which selected applicable companion products of outside manufacturers will provide a complete line of equipment for utility applications.

Flexonics Corp. Forms New Division

Flexonics Corp. has formed an Expansion Joint Div., the second of five operating divisions being established under a new organizational plan recently announced.

E. L. Hiter has been named general manager of the new Division. He will be responsible for both production and sales of all expansion joint and compensator products. Key members of his staff are: R. L. Benton, factory manager, J. E. Isenhart, accounting and office manager and R. M. Quick, assistant sales manager.

Utica Div., Curtiss-Wright Appointment

The appointment of M. J. Stromberg as general parts and service mgr. has been announced by H. C. Clark, general sales mgr. of the Curtiss-Wright Corp. Utica Div.

In his new position, Mr. Stromberg will direct the parts and service program for the entire line of Mercedes-Benz diesel engines ranging from 36 to 3000 hp.

ADS Member Opens New Shop

The Dade Diesel Company, fuel injection service specialists, has opened a new and larger shop. The new shop is located at 2717 N. W. 54th Street, Miami 42, Florida. It is equipped with every modern facility to service fuel injection and governor equipment.

Dade Diesel Co. is a member of the Association of Diesel Specialists, a large group of the top fuel injection and governor sales and servicing shops in the U. S.

Burgess-Manning Elects New Officers

Mr. R. L. Leadbetter, president of Burgess-Manning Co. since 1954, has retired because of poor health. He will continue to be associated with this Company in a consulting capacity and as a Director.

Mr. S. G. Paddock, elected to the office of executive vice president one year ago, was elevated to the presidency.

Mr. H. A. Dietrich was promoted to vice president, in charge of the Industrial Silencer Div.

New Manager For A-C N.Y. District

Appointment of C. F. Kucera as manager of N.Y. district office of Allis-Chalmers Industries Group has been announced. He had been assistant manager of the N. Y. district office since 1957. Prior to that he had been regional representative for transmission equipment in the Southeast Region and before that assistant sales manager in the company's switchgear department. He joined A-C in 1946.

(*Continued on Page* 112)

morco®

Factory-Certified Exchange Crankshafts give Trouble-Free Operation for the Full Life Cycle of Your Diesel Engine

Morco dealers — coast to coast — are stocked with reconditioned, like-new crankshafts for different diesel engine models. Users of Detroit Diesel and Cummins engines can exchange worn shafts for MORCO factory-reconditioned shafts through authorized dealers.

Why take chances? Let your dealer be your source for dependable, safe crankshaft regrinding. You get immediate service, guaranteed quality and terrific economy. Ask your dealer about MORCO today.

Look what Morco's **complete reconditioning service offers you!**

Magnaflux—six separate magnaflux inspections with latest equipment.

Ground on production type equipment to engine manufacturer's specifications. Original stroke retained.

TOCCO* **Induction Hardened** by the original equipment method when necessary.

Rolled Fillets increase strength at the most critical areas.

Dynamic Balance restored on original factory balancing equipment.

Thrust Collars and surfaces repaired.

Gear Fits renewed.

Key Ways restored.

Dowel Holes repaired.

Oil Seal surfaces renewed.

Threads repaired.

*TOCCO is a registered trademark of The Ohio Crankshaft Co.

morco INC.

a subsidiary of **The Ohio Crankshaft Company**

Bedford, Ohio

New Free Bulletin

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Morco, Inc. — **Dept. 1**
22201 Aurora Road, Bedford, Ohio
Please send free copy of "The MORCO Story":

Name_____
Company_____
Address_____
City_____ **Zone**____ **State**_____

new literature

Brochure On Metallic Sealing Rings

The Metal Products Div. of Koppers Co., Inc., has published a comprehensive 8-page brochure on the performance and use of metallic sealing rings. Such seals are commonly used in torque converters, hydraulic equipment, etc.

Included in the brochure are illustrations and definitions of the four major types of sealing rings, a discussion of the combinations of materials used in rings made by Koppers and drawings showing typical applications.

Of particular interest to design engineers is a 4-page specification table on the most widely used sealing rings which is offered with the brochure. According to the company, this is the first time such a table has become available.

Both may be obtained by using the reader service card.

Flexible Gear Coupling Catalog

An enlarged catalog on flexible gear couplings has been published by the Sier-Bath Gear and Pump Co., Flexible Coupling Div. The new C-5 reference manual details the entire range of Sier-Bath types and sizes of couplings. Sections are included on cost-cutting advantages of the product; installation information; typical applications; lubrication requirements and engineering selection data.

Tractor Parts Catalog

Supertec Products have announced publication of a new catalog and price list, detailing their comprehensive line of crawler tractor replacement parts. Fully illustrated, the 26-page brochure covers competitively priced undercarriage and engine parts.

It is claimed that all parts are precision manufactured of highest quality materials and are fully interchangeable with original equipment.

NEW

The Viking Pump line exceeds all others in the rotary pump field. This one fact alone means you can have a pump to really fit your needs . . . one that is efficient for your job.

Send today for the new 36-page catalog giving complete data on 274 General Purpose Viking Pump models. Capacities from ⅔ to 1050 gallons per minute.

In addition, there are 516 other catalogued Viking pumps, plus thousands of special designed models to fit your needs. Viking is truly the pump designed to do your job better.

WRITE today for catalog section BD

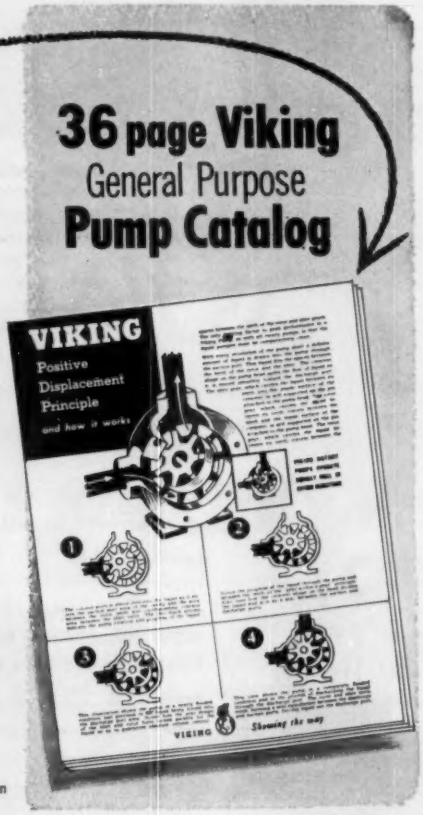
VIKING Pump Company

Cedar Falls, Iowa U.S.A.

In Canada, it's "ROTO-KING"

See Our Catalog in Sweet's Industrial Construction and Plant Engineer's File.

36 page Viking General Purpose Pump Catalog



Bulletin On Ross Heat Exchangers

Bulletin 302,5K1 published by the Ross Heat Exchanger Div. of the American Radiator and Standard Sanitary Corp. covers in detail the C-100 Ross heat exchanger.

The Type C-100 exchanger is suited to a wide range of general industrial applications which may call for a floating head, removable tube bundle, and at times, the corrosion-resistant properties of stainless steel or rolled naval brass.

With parts that are pre-engineered and fully standardized, Ross Type C-100 Exchangers are readily assembled for your operating conditions.

Diagrams and specifications give necessary data for proper selection of exchanger size and arrangement.

Lightweight Truck Diesel Described

A 4-page illustrated brochure describes the newly-developed lightweight GM diesel for trucks which is said to be 690 pounds lighter than its nearest competitor in the 210-hp range.

Described are the design features of the new 6-cyl "71-E" engine which is trimmed to 8.4 lb per hp through the liberal use of aluminum alloys in the cylinder block and other major components. The brochure includes also comparisons of performance and economy of the new GM model with competitive diesels of comparable horsepower based on factory ratings.

"How to Strip Paint" Told by Oakite Booklet

If you've had difficulty in stripping paint from engines, trucks, etc. before repainting, ideas in the booklet called "How to Strip Paint", may solve your problem. Four methods commonly used by leading industrial plants to remove paint are described in detail in the booklet F7893 published by Oakite Products, Inc.

It also describes 12 paint stripping compounds, treatment of metals before repainting and prevention of rust on stripped surfaces in storage.

Automatic Switch Co. Literature

A booklet entitled "New Electromagnetic Control Developments" illustrates and describes ASCO's latest equipment.

The following catalogs are also available from ASCO; Catalog 57-S6 on electric plant controls, engine starting panels, demand start panels, battery chargers, and complete controls for all stand-by electric plants.

Catalog 57-S1 on automatic transfer switches rated 30-1000 amp, up to 750-v, (a-c or d-c) for transfer of power and lighting load circuits from a normal source to an emergency source of supply.

Catalog 57-S2 on remote control switches (30-1000 amp to 750-v a-c or d-c) for convenient and accessible control of power and lighting circuits from any number of control stations.

Catalog 57-S3 on contactors (30-300 amp to 600-v a-c, 250-v d-c) for use where load circuits must be repeatedly closed and opened.

Catalog 57-S4 on relays (10 and 25 amp to 600-v a-c 250-v d-c) magnetically or mechanically held, either conventional or specialized.

Catalog 57-S5 on solenoids (a-c or d-c) engineered to the customer's requirements.

API Catalog Available

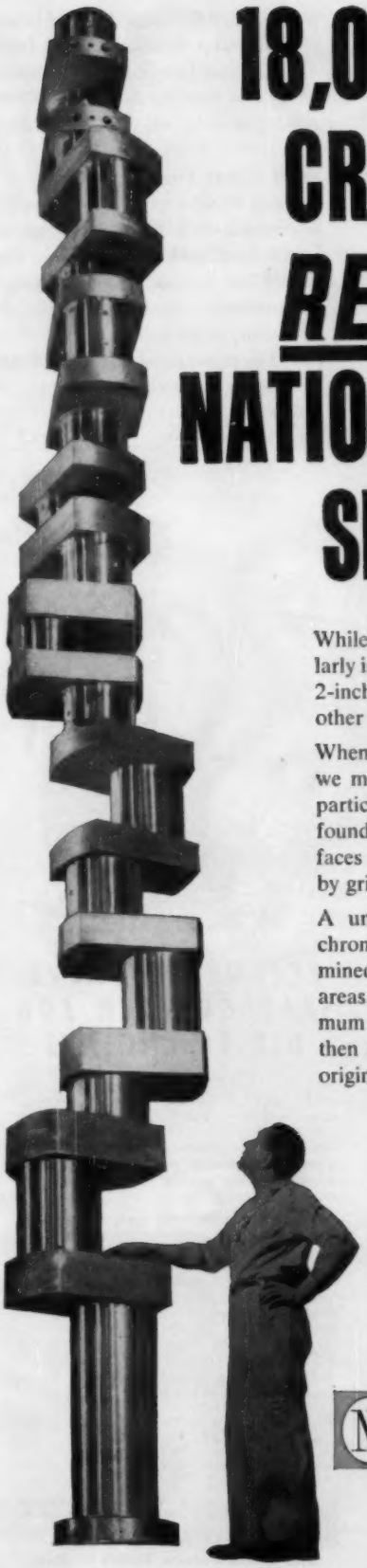
A new catalog of publications and materials of the American Petroleum Institute is now available.

The 58-page booklet contains thumbnail descriptions of each publication, code number, costs, and specific instructions on how each should be ordered. It also points out that quantity discounts are applicable on many of the publications and materials.

Brochure Describes Electric Plants

A new illustrative brochure, describing Jetapower's line of diesel-electric generating plants is now available from the Power Equipment Div. of Jeta Metal Fabricators, Inc. The 4-page, 2-color booklet also describes the company's service policy, facilities, and equipment warranty arrangement.

(*Continued on Page* 104)



18,000 POUND CRANKSHAFT *REBUILT* BY NATIONAL FORGE SPECIALISTS

While National Forge specializes particularly in locomotive crankshafts, this 23-foot 2-inch compressor crankshaft was just another routine reconditioning job.

When this shaft arrived at National Forge, we made a thorough visual and magnetic particle inspection. After the shaft was found to be salvageable, all the bearing surfaces were prepared for chromium plating by grinding and grit blasting.

A unique plating machine deposits the chrome uniformly smooth to a pre-determined thickness—and away from fillet areas. After re-grinding—held to a minimum by accurate plating—the shaft was then finished ground and polished to the original specifications.

No other plating company has National Forge's experience in handling both new and rebuilt crankshafts. So, why not try National Forge Specialists on your next crankshaft rebuilding job?

NATIONAL FORGE & ORDNANCE COMPANY
IRVINE, WARREN COUNTY, PA.
Write for Bulletin Rc 3

new literature

(*Continued from Page* 103)

Bibliography On Diesel Cold Weather Operation

A bibliography of references to literature relating to efficient operation of diesel engines in extremely cold weather has been compiled for the Navy and just released for industry use. Entitled "Cold Weather Operation Of Diesel Engines" the 150 page bibliography costs $3.75.

Included is material relating to the starting and operation of diesel engines, and the use of antifreeze, batteries, starters, fuels, and lubricants at temperatures below -20°F. Information based on non-diesel experience with those items is also included, if it applies to cold weather operation.

Wall Chart For Pipe Users

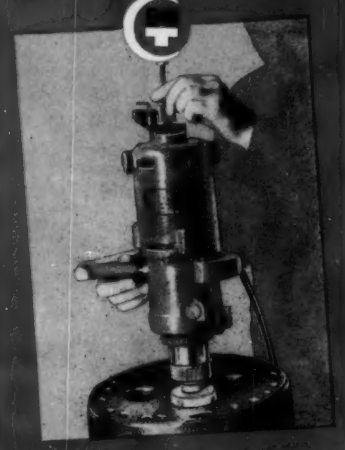
Users of steel pipe will welcome a helpful schedule chart being offered by Midcontinent Tube Service, Inc. It's a 17-in. x 22-in. wall chart, giving all essential pipe-specification information of wall thicknesses, weight and O.D. of seamless and welded steel pipe under ASA schedules from 1/8 to 24-in.

a good seat makes the big difference!

USE

HALL

TOLEDO



write today

ECCENTRIC VALVE SEAT GRINDER FOR DIESEL ENGINES

Only HALL-TOLEDO, with the exclusive eccentric grinding principle utilized in its MODEL EDP VALVE SEAT GRINDER, can assure the best possible performance and operating economy which is the result of perfect valve seating.

Whether you do your own valve work or have a diesel engine service organization do it for you, be certain that the HALL-TOLEDO equipment is used for faster, factory approved precision valve seat grinding. The MODEL EDP, especially designed for heavy duty diesel engines, will handle grinding wheels from 2" to 7" diameter. The Model EJ HALL-TOLEDO VALVE SEAT GRINDER is also available to precision grind smaller valve seats.

The Hall-Toledo Product Line

Valve Seat Grinders for Diesel, Automotive and Aircraft Engines • Valve Guide Reamer and Seat Inserter • Expanding Pilots, Grinding Wheels, Cylinder Hones • Multiple Spindle Grinders for Factory Production

for an authoritative article on valve seat grinding and other helpful literature.

HALL-TOLEDO, INC.

2931 South Avenue, Toledo 9, Ohio

Ductile Iron Pistons For B-L-H 600 Series Engine

Hunt-Spiller Mfg. Corp. has successfully developed, tested and is selling a ductile iron piston for the B-L-H 600 series engine. It is designed to replace the aluminum piston now used in the 600 series engine. It is reported that tests have shown these pistons to have over 3 times the service life of aluminum pistons.

A bulletin is available describing the pistons and giving its advantages. It tells how by using high strength ductile iron, Hunt-Spiller was able to combine the excellent wear and heat resistance properties of cast iron with the high strength-to-weight ratio of aluminum. This provides extra service life in such critical areas as compression ring grooves.

Use of ductile iron has also permitted a change in design whereby all of the piston crown and compression ring area are exposed to oil cooling.

Flexible Coupling Bulletin Revised

Bulletin No. 10100A published by T. B. Wood's Sons Co., has been revised to cover new additions to the line of "Sure-Flex" couplings, which now includes ten sizes.

Selection data and other engineering tables have been revised to include these large and small coupling sizes. The revised tables also include newly-designed couplings with ductile-iron flanges and a special steel retaining ring and specially balanced couplings.

Vibration Control And Bonded Rubber Products

"Dynafacts", a booklet published by the Lord Mfg. Co., gives many facts on bonded rubber products and illustrates and describes different applications.

It is published quarterly and is sent to product designers and other personnel interested in the fields of shock, noise and vibration control. To receive your personal copy, send in the reader's service card.

This issue shows how bonded rubber products are applied to the railroad, construction, mining and aircraft industries.

Versatile Lenox Borescopes Described

A 2-color folder by the Lenox Instrument Co. shows how rapid internal visual inspection of engine cylinders, oil well drill pipe, forgings, castings, etc., is done with their borescopes. These range in size from a few inches to more than 60-ft in length.

Illustrations and detailed descriptions of the three most commonly-used Lenox interchangeable viewing heads are given: the Prism Head that bends the 60-deg cone at a right angle to the axis of the scope to provide a direct view; the Circumference Head, that gives a panoramic-type view of a 360-deg band several inches in length and thus covers a large area at one setting; and the Bottoming Head which contains a ring of small lamps for illumination and viewing of the bottom of cavities.

GM Brochure Explains Diesel Engine Differences

A 12-page illustrated brochure entitled "There *is* a difference in Diesels" has just been released by the Detroit Diesel Engine Div. of GM. It covers such topics as diesel vs. gasoline engines; the difference in 2-cycle and 4-cycle engines; fuel systems; parts interchangeability; service, and others.

It includes information on fuel, to assist diesel engine owners and operators in selecting the type of fuel that gives the most satisfactory engine operation. Copies of the brochure may be obtained by using the reader service card in this magazine.

I-R Gas Engines Described

A series of three new fliers published by Ingersoll-Rand describes a line of 4-cycle, vee-angle gas engines designed for supplying power to industry. Three models of these gas engines are built. They are the PJVG, rated 220-295 hp, the PSVG, rated 408-816 hp, and the PKVG, rated 880-1760 hp.

The machines are said to be rugged, compact and are built for dependable continuous service at partial or full loads and speeds. They are essentially the same engines which are built in Ingersoll-Rand's well-known JVG, SVG and KVG gas engine compressors. The manufacturer claims the engines' smooth-running 4-cycle operation makes them ideal for driving a-c generators. They are also said to be especially suited for driving pumps, blowers, and other equipment.

Aid To Rubber "O"-Ring Users

The Minnesota Rubber Fact Book is a new aid for rubber buyers and engineers. Published by the Minnesota Rubber Co., the fact book is printed on heavy-weight paper for durability and has 16 pages of useful information such as the size numbers and dimensions of all common industrial "O"-rings and the exclusive Minnesota rubber quad ring. These sizes are cross indexed for easy comparison with many of the commonly-used dimensional specifications.

Other information to be found in the fact book includes quick reference charts, information about media in which various rubber compounds can be used, and many other useful facts concerning rubber.

(*Continued on Page* 115)

SPECIALLY ENGINEERED FOR DIESEL ENGINE REBUILDING SERVICE

TOBIN-ARP MFG. CO.
Announces the NEW

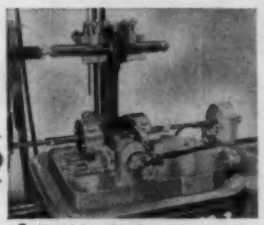
PM 900D PIN FITTING MACHINE

SPECIALLY ENGINEERED TO PRECISION BORE

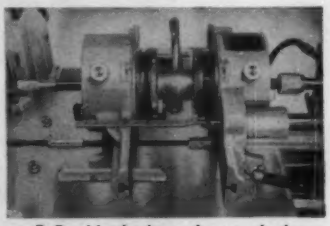
√CONNECTING ROD BUSHINGS
√CAM LEVER BUSHINGS
√ROCKER ARM BUSHINGS

The PM 900D is a precision boring machine—capacity 21/32" to 2⅜". Connecting rod capacity 23". Boring capacity can be increased to 4⅛".

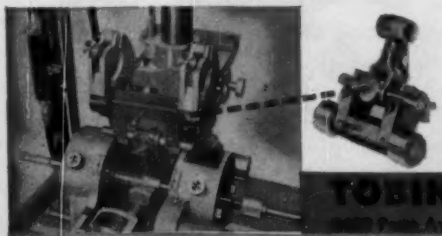
A TAMCO PRODUCT



1 Precision boring piston pin bushing parallel with crank pin bore, to specified center-to-center dimension.



2 Precision boring rocker arm bushings in *less than one minute* per rocker arm.



3 Precision boring cam lever bushings, parallel with roller shaft to specified center-to-center dimension, with Vernier Scale Control.

Write TODAY for complete information!

TOBIN-ARP MFG. CO.

(*Continued from Page* 93)

Worthington Units For Compressor Station

The El Paso Natural Gas Co. will deliver an additional 285 million cu ft of gas per day into Southern California. To do this, they have purchased eight Worthington Turbo-Uniflo engine compressors for transmission service at their new Window Rock, Arizona compressor station.

The Worthington engines incorporate the latest high compression turbocharged design together with a pulse-generator type ignition system.

Worthington's Uniflo scavenging system makes self-sustained turbocharging possible at any speed and load. Exhaust valves are timed to open and close at the proper stroke position without interfering with fixed inlet-port timing. The bulk of exhaust energy is absorbed and utilized for maximum turbocharger efficiency.

GIVE YOUR ENGINE

A FIRST CLASS TICKET

TO

FROM

WITH

CHANNELCROMED LINERS

Proven most durable in eleven years of field use. LOWEST RATE of lubricating oil consumption. Chosen after 3½ year wear tests for the HEAVIEST DUTY ENGINES firing at 2,200 pounds pressure, Diesel cycle.

PENNINGTON CHANNELCROMIUM COMPANY

319 Dakota Street
San Antonio 3, Texas

Write for Bulletin 82

Logging Equipment of Future Predicted

F. G. Evangelist, domestic sales manager for R. G. LeTourneau, Inc., predicts a number of specific developments in logging. He foresees mechanical timber harvesters, able to cope with the giant trees of the Pacific Northwest—not merely the pulp timber in other areas.

According to Evangelist, because the greatest area for cost-saving possibilities is from the stump to the mill, loggers within the foreseeable future will go to larger loading devices and larger transporters in order to handle more units per man-hour. Power for units, of course, will be provided by diesels.

1957 Horning Memorial Award To Waukesha Engineer

A. W. Pope, Jr. cited for more than 30 years of distinguished active service in the field of mutual adaptation of fuels and engines, recently received the Horning Memorial Award. He was given this award after presenting his paper, entitled "Single-Cylinder Engine-Fuel Research." The presentation took place on June 11, during the SAE summer meeting in Atlantic City.

Since 1924, Pope has been with Waukesha Motor Co., and now serves as chief research engineer. He is a graduate of MIT and has been SAE member since 1925.

Missile Support Contract Awarded

A $5,000,000 missile support contract has been awarded Consolidated Diesel Electric Corp. by the U. S. Army Corps of Engineers.

The order calls for 944, 45-kw, 400 cycle, precise power generators, completely enclosed and winterized, for use in missile pre-launching control and communications.

Model TD427, 6-cyl Continental diesels will power the generators. An electric governor will automatically and instantaneously regulate flow of fuel to the diesel in proportion to the electric load on the generator. The units can operate from minus 65°F to plus 125°F at altitudes up to 10,000 ft.

Diesel Shovel Offsets Overburden Removal Cost

Offsetting costs of removing overburden for coal production, the W. G. Duncan Coal Co. is cashing in on a sizeable vein of limestone running through its holdings near Greenville, Ky. Instead of piling up the limestone as waste with other overburden, the company hauls it to a crushing plant which turns out roadstone for building and maintaining roads within the mining area.

Secondary to the company's coal mining activity, the operation has proven a profitable venture. This is largely due to the impressive record of the Marion shovel shown. The 1½-yard Marion, powered by a 6-71 GM diesel engine, has worked steadily two 8-hr shifts per day for seven years with minimum expenses for up-keep. The hauling unit, also shown, one of the three rear-dump Euclid trucks on the job, is also GM diesel-powered and has a similar service record.

SALES and SERVICE on HYDRAULIC and MECHANICAL GOVERNORS and FUEL INJECTION EQUIPMENT

Expert Factory-Trained Personnel
Factory-Approved Equipment

Fully equipped Governor Dep't. Left to right: Aircraft, Railroad, Industrial and Automotive Governor Test Stands.

Complete facilities for Woodward, Farris-Pickering, Marquette and Pierce Governors

A & D DIESEL SERVICE
143 21st. Street
Brooklyn 32, New York
Phone STerling 8-4222

ASSOCIATION of DIESEL SPECIALISTS — ACCREDITED DEPENDABLE SERVICE — Member — A·D·S

Surface Transit, Inc., of N. Y. Buys 10 Mack Buses

Mack Trucks, Inc. has sold 10 transit-type buses, featuring ultra-modern luxury interiors, to Surface Transit, Inc., of N.Y.C. These buses are powered by Mack's Thermodyne diesels. Other comfort features include Mack's air suspension system, extra-wide aisles, exceptionally high head room and power ventilation.

Little Gas Turbine Starts Big Ones

The Garrett Corp. has sold 40 small gas turbine engines to Eastern Air Lines as a power source to start the Lockhead Electra propjets they will place into service late this year. The little jets which will start the big jets are produced by Garrett's AiResearch Manufacturing Division.

Mounted on panel trucks, the 200-hp turbines, weighing about 250 lbs, supply compressed air for pneumatic starting of the propjets as well as electrical power to operate the plane's refrigeration and heating systems and to check out the plane's radio, radar and hydraulic systems while on the ground.

Other airlines are also studying the possible use of cart or truck-mounted gas turbines to start big turbine engines.

Great Northern RR Is Completely Dieselized

The Great Northern Railway has retired its 36 remaining steamers. All but six of these will be scrapped. The survivors will be kept only to generate steam to thaw ore cars during freezing weather.

The Great Northern is now completely dieselized. Their electric locomotives were retired in August, 1956. They installed a high volume ventilating system in the 8-mile Cascade Tunnel in Washington State. Giant fans now bring cooling air to diesels operating through this longest rail tunnel in the Western Hemisphere.

Great Northern's current roster of diesel-electric locomotives stands at 462 engines, separate units number 656.

AERA Election

The following officers were elected for 1958, at the recent Automotive Engine Rebuilders Association conference in Washington, D.C.

President: Leonard Connett, Piston Ring Service Co., New Orleans, La.; 1st V.P.: Franklin C. Bradley, Jr., Connecticut Bearings Co., Inc., New Haven, Conn.; 2nd V.P.: Richard S. Love, The Love Machine Co., Inc., Salt Lake City, Utah; and Treasurer: George W. Yount, Eagle Machine Company, Indianapolis, Indiana.

The following new directors were elected for three year terms.

Clyde Brooks, Brooks-Noble Auto Parts & Machine Co., Jackson, Miss.; Douglas W. Carlson, Carlson Machine Works, Sioux City, Iowa; William Hedges, Bill Hedges Auto Parts, Portsmouth, Ohio; and Frank M. Norfleet, Parts, Inc., Memphis, Tenn., was re-elected for a second term.

new products

(*Continued from Page 97*)

Diesel Exhausts Made To Smell Fresh

F. C. Binter, president of Independence Chemical Co. has developed an exhaust-purifying device called "Nodorizer." He has also developed a complex chemical compound, "Dieseleen," which is said to neutralize unburned hydrocarbons and re-odorize diesel exhaust fumes with a clean fresh-air scent.

The "Nodorizer" unit takes the pressurized air from the engine "wind box" and forces it through a chemical compound. Then the force of this air stream injects the chemical into the exhaust pipes.

"Dieseleen," the chemical compound contained in the unit, accomplishes a neutralizing process, reacting with unburned by-products that cause odor and irritation. The neutralized exhaust stream is then re-odorized with suitable scents.

According to Binter, there is no reduction of power with the Nodorizer and it is reportedly effective even under heavy acceleration. It adds very little to operating costs.

The World's Leading Manufacturers of

FUEL INJECTION EQUIPMENT

for Diesel Engines

Depots and Service Agents in over 100 countries

C.A.V.

FUEL INJECTION EQUIPMENT DIVISION

of

LUCAS ELECTRICAL SERVICES, INC.

Head Office: 501 West 42nd St., New York
Sales Office: 14820 Detroit Avenue, Cleveland 7, Ohio
West Coast: 5025-29 W. Jefferson Blvd., Los Angeles 16, California
Canadian Distributors:
Joseph Lucas (Canada) Ltd., Head Office: 11 Davies Avenue, Toronto 8, Ontario
Branch Office: 3401 St. Antoine Street, Montreal 30, Que.

*AP*174-819

Farris Pickering Has New Governor

A compact, light-weight hydraulic governor of the speed-droop, lever type has been announced by Farris Pickering Governor Co., Inc., Palisades Park, N. J. Designated the Type 4300, it is designed for speed control of diesel or gasoline generator sets, engine-driven compressors, engine-driven arc welders, marine engines, trucks, tractors, hoists, bulldozers and similar equipment. It weighs 10½ lb, is 6⅛-in high and has work capacity of 12 in lb.

Type 4300 is suitable for variable- or constant-speed service. It uses engine lube oil as the pressure medium. The unit provides immediate response to load change and will regulate within ¼% steady state operation. Mounting pads, terminal and speed-adjusting shafts are interchangeable with present field installations. A bulletin is available.

High-Capacity Fulflo Filter

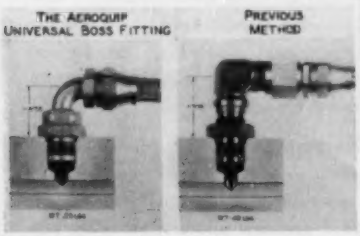
A new high-capacity Fulflo Filter is available in a full range of sizes, with 24 to 270 10-in. filter tubes. These are of Commercial's special honeycomb design using specially-prepared cotton material wound to give graduated filtration in depth. It provides continuous micro-clarity for all industrial fluids at flow rates as high as 1350 gpm, with low pressure drop. A new swing-bolt cover permits easy access to filter tubes. An optional cover-lifting davit further simplifies servicing.

A folder containing complete technical data is available from the Commercial Filters Corp. Use our Reader Service card.

A-C Redesigns High-Speed Synchronous Generator

Redesign of its high-speed synchronous generators in single-bearing units for internal combustion engines, close-coupled to standard SAE flanges, or in two-bearing units for belt drives or direct connection has been announced by Allis-Chalmers.

Available in ratings from 30 to 150 kw at 1800 rpm and 50 to 300 kw at 1200 rpm, the high-speed synchronous generators feature an improved exciter located inboard of the bearing to provide a shorter, lighter, more compact machine.



Universal Boss Fitting Saves Weight, Simplifies Installation

A great saving in weight (48% in ½" tube size), simplified installation, and a smaller envelope are among the advantages of a new Universal boss fitting. It has been developed by Aeroquip Corp.

The fitting achieves these advantages by eliminating the bulky AN adapter commonly used. Elbow fittings may be positioned upon installation, thereby avoiding pre-positioning and reducing steps necessary for installation.

Since no swing clearance is necessary, bosses may be spaced closer.

Gear-Type Flexible Coupling

Link-Belt Co. has a new low-cost gear-type flexible coupling for shaft diameters up to 1⅞-in. Called the type MC, it is designed for use as an electric motor coupling for transmitting power to pumps, generators, speed reducers, etc.

Basic principles of operation are like those of a conventional gear coupling. Externally geared hubs are mounted on the shafts and joined flexibly by an internally geared sleeve.

(*Continued on Page* 110)

"Old Timers" among liners are
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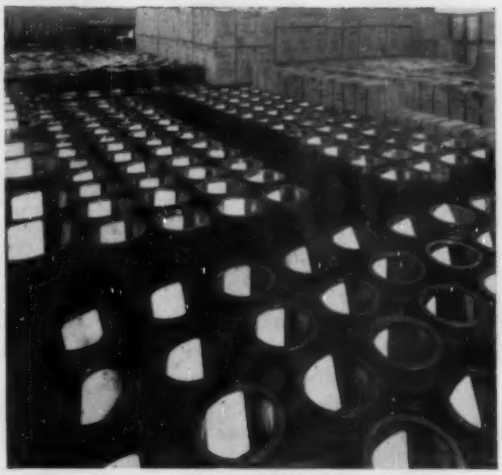
Most "old timers" among liners in service today are Mecrome plated liners! Our unique plating process increases liner life by evenly distributing the pockets that retain the lubricating oil throughout the chromium-plated liner surface. This creates a strong bearing surface, without hard or soft spots and results in long engine life, rapid "break-in" cycles and superior lubrication. Send us a trial order today!



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THE BRIGGS FILTRATION COMPANY, RIVER ROAD, WASHINGTON 16, D. C.

new products

(*Continued from Page* 109)

Engine Starting Fluid

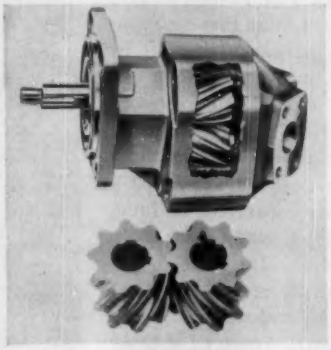
Instant, safe starts for any diesel engine are claimed by the Wilco Co., makers of Sure Fire engine starting fluid. This low-ether starting fluid has reportedly been tested satisfactorily by major oil companies and engine manufacturers.

It is designed to start engines down to minus 65°F. It can be injected directly into the air cleaner or air intake stream. Its low-ether content protects engine against upper cylinder area damages and relieves engine wear by eliminating slow, hard starts in damp or cold weather.

High-Speed Rotary Gear Hydraulic Pump

A high-speed hydraulic pump featuring a new gear design has been introduced by Hupp Aviation Co. Designated the Hupp Hydroid Pump, the unit features gears with an elliptical profile that eliminates trapping of liquid between teeth.

The non-trapping feature permits speeds of over 4000 rpm with hydraulic pressures of more than 1500 psi. Flow rates from 3 to more than 250 gpm are available for specific applications. Ability to operate at high speeds elimintes need of costly reduction gearing accessories on hydraulic applications.



Super-Turbo Engines Power Cat Tractors

A new series of DW20 and DW21 wheel Tractors equipped with Super-Turbo engines has been introduced by Caterpillar Tractor Co.

Diesels in the Cat DW21 (Series D) and DW20 (Series F), provide a maximum output of 320 hp, with inproved torque rise characteristics. These improvements give increased lugging ability and higher travel speeds.

The air induction system of the Super-Turbo engine provides accurate control of turbocharger speed over its complete range and delivers more air to the engine. This allows the engine to operate at maximum efficiency regardless of varying loads.

Temperature of the air leaving the turbocharger is lowered by going through an after-cooler. Use of this aftercooler results in 14% more air (by weight). Twin air cleaners and larger manifolds provide for increased breathing capacity.

In addition to the air induction system, many engine components have undergone design changes. Included are new pistons; stronger piston pins, pushrods, rocker arms, camshaft, a newly-designed cylinder head and block, new bearings, and addition of a primary fuel filter.

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- International Harvester Injection Testers
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Ferox is said to destroy the oxidase causing rust in the same way that growth of bacteria is arrested by germicides. It is effective for removing heavy scale and deep rust incrustations from iron and steel.

It is also reported to remove corrosion from brass, bronze and copper, chrome and nickel plate, galvanized and zinc surfaces. It is good for freeing studs, bolts and nuts frozen with rust.

Installed Valves Converted From Hand to Electric Operation

You can convert installed valves from hand-operation to electric motor operation with a low cost conversion unit called Valvmatic. It can be installed without special engineering, disturbing piping or replacing existing valves. This push-button-operated valve actuating conversion unit, is made by the C. H. Wheeler Mfg. Co.

Valvmatic can be used in nearly every application where the valve handle doesn't rise, and where the valve handle can rotate when the valve is operating under power.

Changeable Drawer Tool Chest

Engineered to provide versatility, Snap-On Tool Corporation's new tool chest and new drawer section have changeable drawer features. This enables the user to design his own tool storage unit to meet his own particular requirements.

The tool chest permits selection of different size drawers. All deep drawers, all shallow drawers, or a combination of deep, shallow, and medium-depth drawers can be selected. This provides just the right combination for a specific operation.

The new drawer section is designed to fit under the tool chest and is also available with the new changeable drawer feature.

Explosion-Proof Hour Meter

A new explosion-proof hour meter, for use on diesel engines, generators and air compressors which might be located in hazardous locations is now available. It is made by the John W. Hobbs Corp. a division of Stewart-Warner Corp.

Available for 12 to 32-V d-c applications, the precision-built instrument is housed in a specially designed, explosion-proof case which is approved by Underwriter's Laboratories under Class 1, Group D specifications.

New Switchboard Instruments Eliminate All Rolling, Sliding Friction

A new KX-241 line of circular-scale switchboard instruments, has been developed by the Westinghouse meter division. A taut-band suspension that uses no pivots or bearing makes the instruments completely free of rolling or sliding friction. This new development makes it possible to build electrical measuring instruments that can withstand severe vibration and shock without any effect on their accuracy.

people and plants

(*Continued from Page* 101)

Diesel Control Named Pickering Governor Distributor

Farris Pickering Governor Co., have expanded their sales and services organization in the southern half of California. They have appointed the Diesel Control Corp., Wilmington, Calif. as their exclusive distributor.

To provide immediate service to users of Pickering governors in the Southern California area, Diesel Control now has complete stocks of service parts and governors of the type used in the industrial and marine fields. Appointment of this new distributor, also brings to Pickering Governor users, extensive service and overhaul facilities of Diesel Control, including the availability of their Universal governor test stands.

Purolator Promotions

Two appointments in the Research and Development Department were announced by J. Kovacs, vice-president in charge of research and development at Purolator Products, Inc., Rahway, N. J.

J. T. Kukowski has been appointed acting supervisor of the Research Laboratory and John Van Lier acting supervisor of the design section.

Since 1955, Kukowski has been research engineer in Purolator's Research and Development Department.

Since 1954, Van Lier has been supervisor of bulk filtration at Purolator and engineer-in-charge of the company's bulk filtration and tank fabrication facilities.

Hoerbiger Opens New Office and Warehouse

The Hoerbiger Corp. of America has commenced operations at its new headquarters at 160 Van Brunt Street, Brooklyn 31, N. Y. This internationally known firm makes diesel engine scavenging valves, valves and valve components for air, gas and refrigerating compressors, compressor regulators and related products. It brings to the United States the experience and dependability that have made the Hoerbiger name a respected one for years.

Hilliard Opens European Office

Opening of a new European office has been announced by T. A. LeBrecque, vice-president and mgr, Purifier Div., The Hilliard Corp. The new office in Zurich, Switzerland, will handle sales and service of the company's European representatives.

Mr. Kunstenaar, formerly manager of Hilliard's Export Dept. in Elmira, N. Y., has been transferred to Zurich, to coordinate Hilliard's European activities in the oil purification market.

Flexonics Appointments

Eugene Ransom has been appointed general manager of the Industrial Hose Div. at Flexonics Corp. He succeeds E. W. Driedger, who resigned. Mr. Ransom is to be responsible for production and sales of all Flexon industrial hose products.

J. R. Strother has been appointed sales manager of the Industrial Hose Div. J. F. Fisher is Div. factory manager, L. B. Donkle is Div. Engineering manager, and J. A. Downey production manager.

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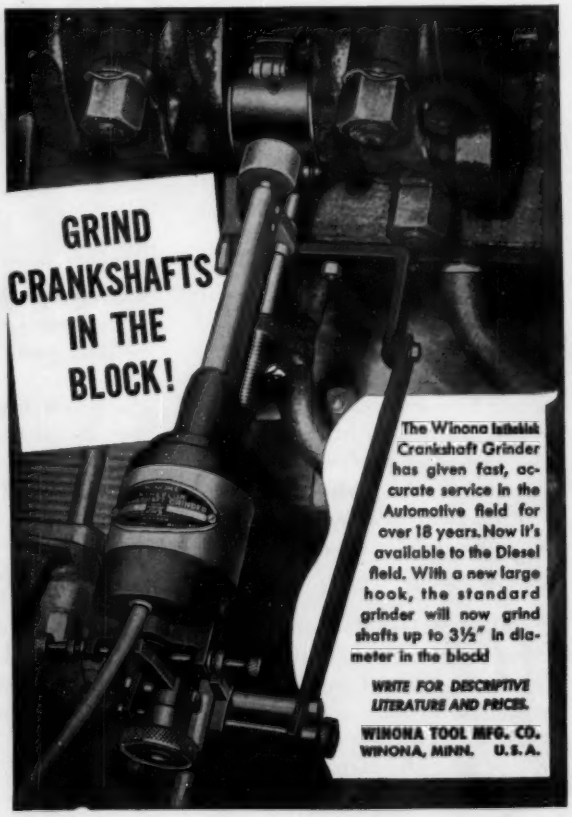
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Automatic Engine Control Sets • Special Control Panels • Safety Alarm Sets • D.C. Solenoids • Heavy Duty Relays

new literature

(*Continued from Page* 105)

Alco Drilling Rig Packages

"Alco diesel-electric power packages for drilling rigs" is the title of an 8-page booklet issued by Alco Products, Inc. It explains the application and advantages of Alco offshore diesel drilling power packages.

Features of the various components are described and illustrated. Performance curves and arrangement diagrams are also given.

Shut-Off Valves Protect Gauges

Automatic shut-off valves for overload protection of gauges and instruments in hydraulic and pneumatic systems are described in a Sprague Engineering Corp. bulletin.

Six models offer pressure ranges from 10 to 10,000 psi. The new bulletin lists specifications, features, installation and adjustment details for these automatic shut-off valves. The reader service card will make it easier for you to get this bulletin and additional data.

Battery and Charger Package Assures Positive Starting

A new bulletin published by C & D Batteries, Inc., describes operation of their new combination package of C & D AutoReg Silicon charger and C & D long-life Plasti-Cal lead-calcium plate batteries. Both charger and batteries are specifically engineered to work together as an efficient unit which guarantees full power when needed. It is claimed that up to 25 years of trouble-free service can be obtained, depending on the battery type selected.

Curves and diagrams illustrate discharge and charging characteristics of the charger-battery combination from the time the engine demands starting power until the battery reaches full charge again.

Industrial Tool Catalog

A 1958 industrial tool catalog, with illustrations and specifications of all Thor portable electric and air tools is now available from the Thor Power Tool Co.

The convenient pocket-size (5 by 6½-in.) No. 85 catalog contains 47 pages of portable power tools. Included are: balancers, belt sanders, bench grinders, drills, generators, grinders, hammers, impact wrenches, nibblers, nut setters, polishers, sanders, saws, scalers, screwdrivers, tappers, tuck point grinders, valve seat grinders, and valve refacers.

Chart Makes Solving Of Complex Formula Easy

One of the most disliked formulas because of the time required to use it, is the one for determining the logarithmic mean temperature difference (LMTD) in heat transfer calculations. It is easier to find the average temperature difference, and, even though the result is incorrect, the easy method is often used. However it should never be used on important work.

A chart now available from Dean Thermo-Panel Coil Div., Dean Products, Inc. makes the work of finding LMTD very easy. This chart can be obtained by just sending the reader service to Diesel Power.

(*Continued on Page* 117)

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new literature

(*Continued from Page* 115)

Measuring and Sampling Petroleum and Petroleum Products

The third edition of a manual containing ASTM methods required to measure and compute the quantity of oil in storage and transportation tanks of various types. and for obtaining typical samples of the tank contents is now available. The methods have been revised to improve their usefulness and practicability. They are written concisely, yet in sufficient detail to permit the procedures to be followed without further instruction.

Copies of this book may be obtained from the American Society for Testing Materials Headquarters, at $3.50 per copy. Use the ready service card for further information.

Movie On Heavy-Duty Earthmoving And Mining Equipment

A color-sound movie for operators of heavy-duty earthmoving and mining equipment using the 9-speed, single-stick Fuller R-1550 Road-Ranger transmission has been produced by the Fuller Mfg. Co.

The 16-mm film explains how to properly shift the closely-spaced gear ratios for maximum performance with diesel engines in the 1550-cu in. class. The movie also deals with performance under given operating conditions and the pressurized lube oil system in the transmission.

Cranes and Shovels Standard Published

The new edition of "Power Cranes and Shovels", Commercial Standard CS90-58, is now available, according to the Commodity Standards Div., U.S. Dept. of Commerce. It applies to machines of the convertible full-revolving type on crawler, truck, and wheel mountings.

Chief purpose of the booklet is to establish uniform methods for guidance in specifying features of the machines and in presenting data concerning their construction, performance, and control. The standard includes safety requirements, recommendations for export, labeling, certification of compliance with the Commercial Standard, and definitions of terms peculiar to the industry.

Price is 20c per copy.

Filter Manual Covers 30 Filter Types

A new 132-page, two-color filter engineering and application reference manual is now available from the Bendix Filter Div., Bendix Aviation Corp. The new manual deals with filters for aircraft, missiles, industrial and ground support equipment.

Filters for lube oils, diesel fuels, jet fuels, hydraulic fluids, compressed air, gases, de-icing fluids, air conditioning systems, test stands and refueling installations are described.

Engineering specifications including components and parts numbers, flow curves, capacities and sizes, exploded views and cross-section drawings are given for nearly 30 different types of filters and filter elements discussed.

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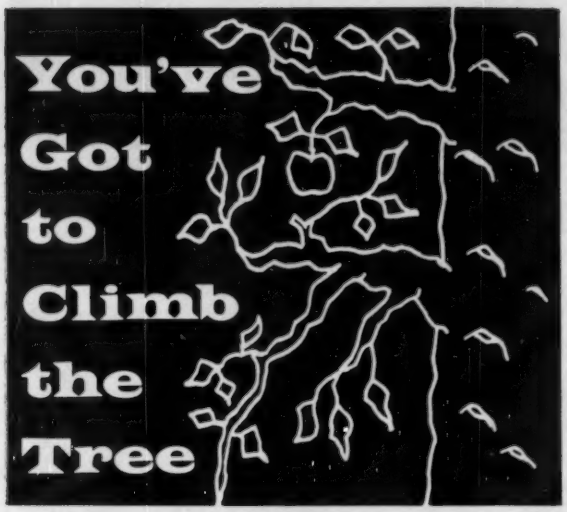

One morning early in July a small snail started to climb an apple tree. A smart aleck beetle stuck his head out of the bark and said: "Hey you crazy snail – why do you keep going up that tree? There ain't no ripe apples up there."

"Don't let it worry you bub," quipped the snail, "there will be when I get there."

So it goes with Diesel Power advertisers – climbing steadily for sales that are ripening sure as the good Lord made little green apples.

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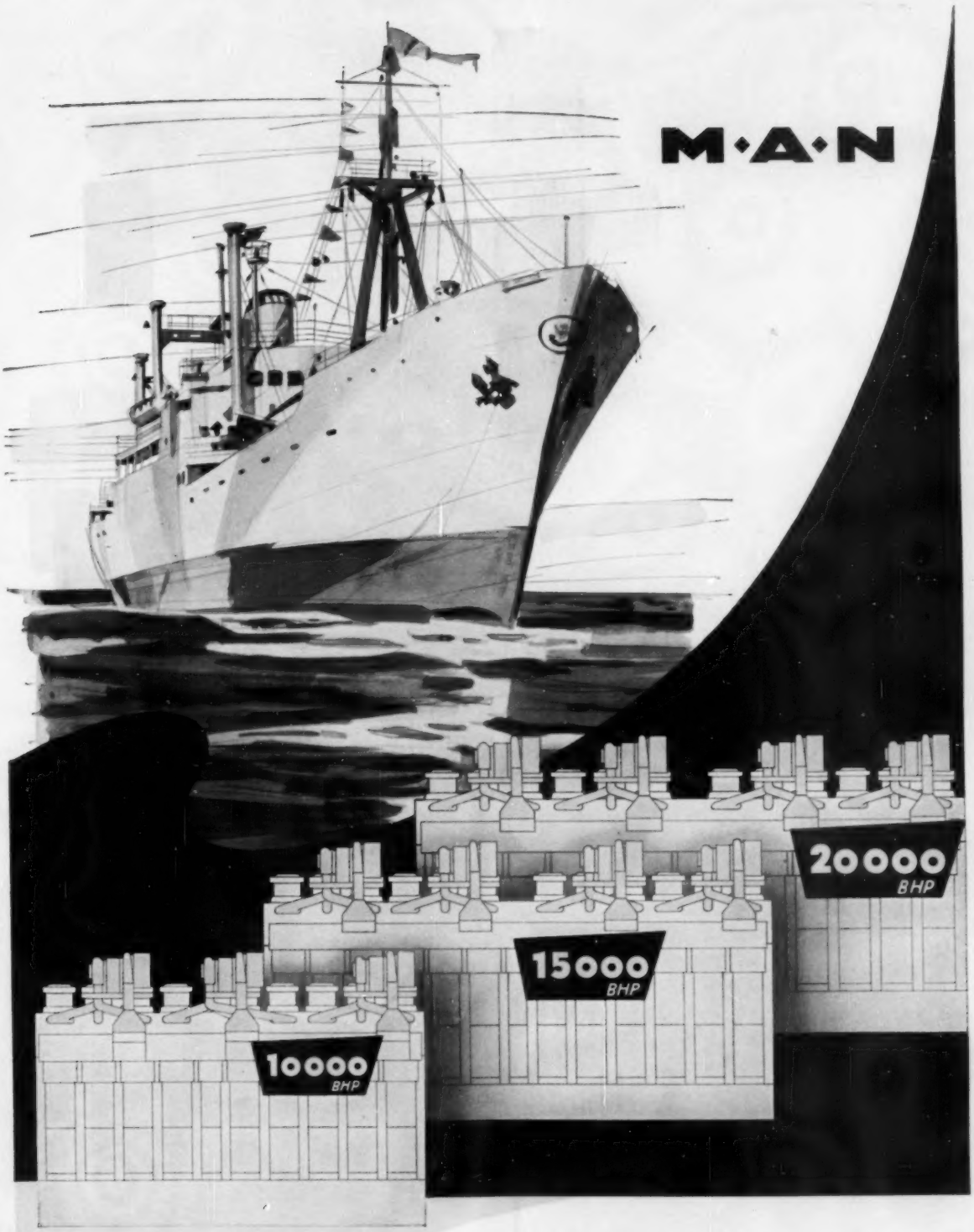

M. A. N. Diesel Engines are built in 11 countries by 25 licensees

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What made Thief River Falls decide on STANDARD D&G Oil

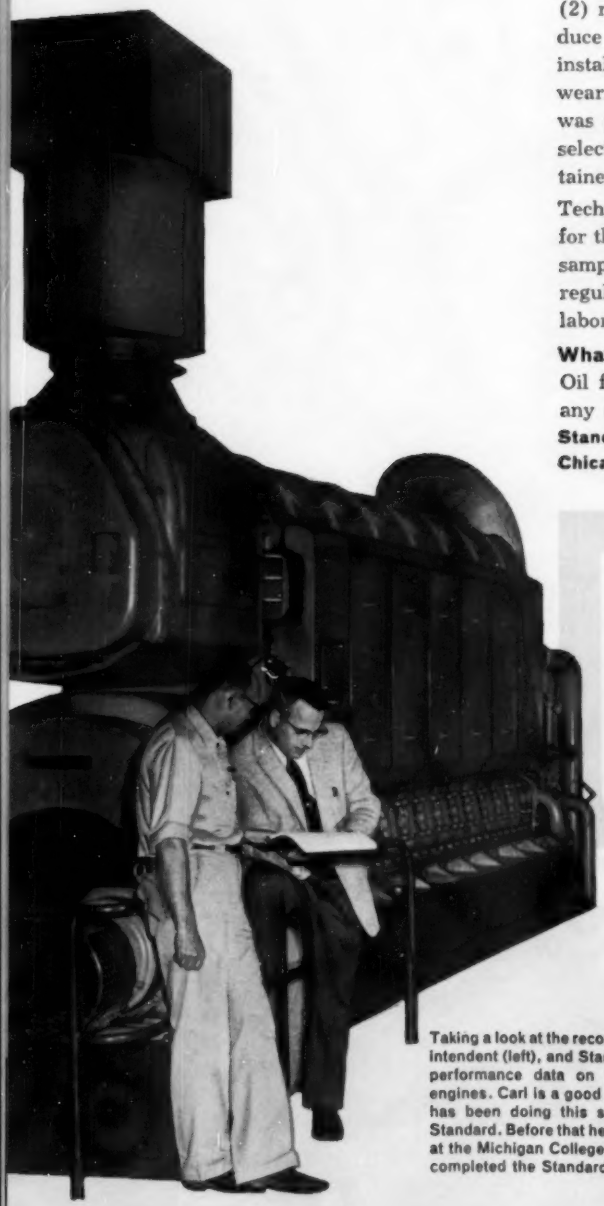
Two Fairbanks-Morse OP engines turn in top-rated performances with this lubricant.

The situation: In January of 1952 the Thief River Falls, Minnesota, municipal light plant put into service a 10-cylinder, 1,600 hp. Fairbanks-Morse opposed piston engine. In November, 1955, a 1,900 hp. Fairbanks-Morse OP engine was added.

What was done: The power plant management discussed lubrication requirements with Standard Oil lubrication specialists. Because of the evidence that STANDARD D&G Oil, with its higher additive level, could (1) reduce ring and wall wear, (2) reduce ring sticking, (3) increase bearing life and (4) reduce engine deposits, this oil was selected for the first engine installed. After 22,000 hours, inspection showed little or no wear. Small wonder then that when the second OP engine was put into service in 1955, STANDARD D&G Oil was again selected. After 7,500 hours, similar performance is being obtained on the newer engine.

Technical service performed by Standard Oil men pays off for the power plant management. Standard men take frequent samples for field inspection of oil condition. Other samples are regularly taken for transmittal to Standard's Whiting, Indiana, laboratory for complete analysis.

What you can do: Get more facts about STANDARD D&G Oil from the Standard Oil lubrication specialist near you in any of the 15 Midwest and Rocky Mountain states. Or write **Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Illinois.**



Taking a look at the record. Morris L. Owen, plant superintendent (left), and Standard Oil's Carl Klenner look at performance data on the two Fairbanks-Morse OP engines. Carl is a good one to talk things over with. He has been doing this sort of work for 10 years with Standard. Before that he received an engineering degree at the Michigan College of Mining and Technology and completed the Standard Oil Sales Engineering School.

Quick facts about STANDARD D&G Oil

- Made from highest-quality solvent-refined stock.
- Contains additives which impart superior detergent-dispersant and anticorrosion properties.
- Antifoaming.
- Oxidation-resistant.
- Recommended for use (1) with economy fuels (2) in extreme-load and/or low-temperature service.

You expect more from STANDARD *and get it!*